

# FZ

## Textile Industry Standard of the People's Republic of China

FZ/T 93033—2014 (2017)

Replace FZ/T 93033—2004

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### Flat carding machines

### 梳棉机

*(English Translation)*

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## Foreword

This standard is drafted in accordance with the rules given in the GB / T 1.1-2009 *Directives for standardization-Part 1: Structure and drafting of standards*. SAC/TC 215 is in charge of this English translation. In case of any doubt about the contents of English translation, the Chinese original shall be considered authoritative.

This standard replaces the FZ/T93033-2004 *Flat carding machine* in whole.

In addition to a number of editorial changes, the following technical deviations have been made with respect to the FZ/T93033-2004 *Flat carding machine*.

- Revised English translation of the standard name (see the cover of 2004 Edition);
- Modified the parameters (see Table 1, Table 1 of 2004 Edition);
- Added the requirement for feeding device (see 4.1);
- Modified the requirements of cylinder and doffer bearing pedestal vibration amplitude (see 4.2.1, 4.1.1 of 2004 Edition);
- Added the requirements of cylinder drum, allowable unbalance of cylinder, doffer drum and pre-carding element (see 4.2.2, 4.2.3, 4.2.4 and 4.2.9);
- Modified the requirements of baseplate rotation stability and top plate vibration amplitude (see 4.3, 4.2 of 2004 Edition);
- Added the requirements of whole machine taken safety protection measures and warnings according to the provisions of GB/T 17780.1 and GB/T 17780.2 to avoid harm of product to human health during use (see 4.6.3);
- Added the requirements of electrical fast transient/burst immunity, electrostatic discharge immunity, connection and cabling, and wire identification (see 4.7.1, 4.7.2, 4.7.3, 4.7.4);
- Modified the requirement of noise (sound power level) of the whole machine and adding the requirement of sound emission pressure level (see 4.8, 4.7 of 2004 Edition);
- Modified the requirement of power consumption (see 4.8 of 2004 Edition);
- Modified the unit of weight unevenness and parameters (see Table 4, Table 3 of 2004 Edition);
- Added the calculation method of sliver weight unevenness (see 5.1.21);
- Modified the working load test conditions (see 5.3.1, 5.2.1 of 2004 Edition).

This standard was proposed by China National Textile and Apparel Council.

This standard was prepared by This standard was prepared by Subcommittee 1 on Spinning,

Dyeing and Finishing Machinery of Committee 215 on Textile Machinery and Accessories of Standardization of Administration of China (SAC/TC215/SC1)

This standard was issued in 1995 as first edition, was first revised in 2004. This is the second revised edition.

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# Flat carding machines

## 1 Scope

This standard specifies the classification, parameters, requirements, test methods, inspection rules, marking, packaging, transportation and storage of flat carding machines.

This standard is applicable to flat carding machine for carding cotton fiber, cotton type wool, hemp, chemical fiber and medium length fiber.

## 2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

GB/T 191, *Packaging — Pictorial marking for handling of goods*

GB 2894, *Safety signs and guideline for the use*

GB 5226.1-2008, *Electrical safety of machinery — Electrical equipment of machines — Part 1: General requirements*

GB/T 7111.1, *Textile machinery—Noise test code—Part 1: Common requirements*

GB/T 7111.2, *Textile machinery—Noise test code—Part 2: Spinning preparatory and spinning machinery*

GB/T 9239.1-2006, *Mechanical vibration — Balance quality requirements for rotors in a constant (rigid) state — Part 1: Specification and verification of balance tolerances*

GB/T 17626.2-2006, *Electromagnetic compatibility — Testing and measurement techniques — Electrostatic discharge immunity test*

GB/T 17626.4-2008, *Electromagnetic compatibility — Testing and measurement techniques — Electrical fast transient/burst immunity test*

GB/T 17780.1, *Textile machinery — Safety requirements — Part 1: Common requirements*

GB/T 17780.2, *Textile machinery — Safety requirements — Part 2: Spinning preparatory and spinning machines*

GBZ/T 192.1-2007, *Determination of dust in the air of workplace — Part 1: Total dust concentration*

FZ/T 90001, *Product package of textile machinery*

FZ/T 90074, *Painting for the products of textile machinery*

FZ/T 90089.1, *Textile machinery nameplate—Part 1: Types, dimensions and specifications*

FZ/T 90089.2, *Textile machinery nameplate—Part 2: Information*

FZ/T 92029, *Cards—Flat bars*

FZ/T 93019, *Flat fillet clothing for carding process*

FZ/T 93038, *Wires for metallic card clothing of the card*

FZ/T 93089, *Feeding hopper*

FZ/T 93090, *Pre-carding plate*

FZ/T 99014-1995, *Electrical equipment of textile machinery—General technical requirement*

### 3 Classification and parameters

#### 3.1 Classification

3.1.1 This machine is divided into common type and high-speed type according to maximum output speed.

3.1.2 This machine is divided into lap feeding and hopper feeding according to feeding type.

#### 3.2 Parameters

Parameters are shown in table 1.

Table 1

| Item                                    | Parameter       |                 |
|---|-----------------|-----------------|
| Suited spinning fiber length / mm       | 22 ~ 65         |                 |
| Working width / mm                      | 1000 ~ 1500     |                 |
| Maximum lap working diameter×width / mm | 550 x 980       |                 |
| Working width of feeding hopper / mm    | 920 ~ 1500      |                 |
| Sliver count / (g/m)                    | 3 ~ 12          |                 |
| Maximum output speed / (m/min)          | Common type     | < 140           |
|   | High speed type | ≥ 140           |
| Can specification / mm                  | Diameter        | 600, 900, 1000  |
|   | Height          | 900, 1100, 1200 |

### 4 Requirement

#### 4.1 Feeding device

4.1.1 Speed of feeding device is adjustable.

4.1.2 Feeding by hopper shall conform to FZ/T 93089.

## 4.2 Carding system

4.2.1 The vibration amplitude of cylinder and doffer bear pedestal: maximum 0.07 mm for common type, and maximum 0.035 mm for high-speed type.

4.2.2 The radial runout tolerance of cylinder outer circle to axis should be less than 0.025 mm.

4.2.3 The allowable unbalance of cylinder shall comply with the requirements of balance quality G1.6 in GB/T 9239.1-2006.

4.2.4 The radial runout tolerance of doffer outer circle to axis should be less than 0.020mm.

4.2.5 Flat shall comply with the requirement as specified in FZ/T 92029.

4.2.6 Flat shall not have obvious undulation, and the deviation should be less than 1.0 mm.

4.2.7 The horizontal vibration amplitude in the highest point of the Flat bracket: maximum 0.12mm for common type, and maximum 0.10mm for high-speed type.

4.2.8 Cylinder start-up time shall comply with the requirements in table 2.

Table 2

| Item                                | Parameter |       |
|-------------------------------------|-----------|-------|
| Cylinder rotation speed / (r / min) | 330 ~ 360 | > 360 |
| Cylinder start-up time / s          | ≤ 120     | ≤ 240 |

4.2.9 Pre-carding element shall conform to FZ/T 93090.

## 4.3 Coiler system

Coiler transmission system is in good condition without abnormal sound; the baseplate rotates stably; and the top plate vibration amplitude should be less than 0.15mm.

## 4.4 Transmission system

4.4.1 The transmission mechanism in the whole machine runs smoothly without abnormal vibration.

4.4.2 The temperature rise of each bearing should be less than 20 °C.

## 4.5 Dust extraction system

The suction pipeline shall be well sealed, and the inner surface of the fiber channel shall be smooth and fiber-adhesion free, without burrs.

## 4.6 Safety

4.6.1 Installation of the protective cover of the whole machine shall be accurate in position, firm and reliable.

4.6.2 Installation of the motor shall conform to 10.5 in FZ /T 99014-1995.

4.6.3 Whole machine shall take safety protection measures and warnings according to GB/T 17780.1 and GB/T 17780.2, to avoid harm to human health during use of the product.

#### 4.7 Electrical equipment and automatic control mechanism

4.7.1 Electrical fast transient/burst immunity of the electrical equipment shall comply with the provisions of level 3 in GB/T 17626.4-2008.

4.7.2 Electrostatic discharge immunity of the electrical equipment shall comply with the provisions of level 4 in GB/T 17626.2-2006, and the equipment shall not have abnormal action during the test.

4.7.3 Connection and cabling of the electrical equipment shall comply with the provisions of 13.1 in GB 5226.1-2008.

4.7.4 Wire identification of the electrical equipment shall comply with the provisions of 13.2 in GB 5226.1-2008.

4.7.5 Continuity of the protecting connection circuit of the electrical equipment shall comply with the provisions of 18.2.2 in GB 5226.1-2008.

4.7.6 Insulation performance of the electrical equipment shall comply with the provisions of 18.3 in GB 5226.1-2008.

4.7.7 Withstand voltage test of the electrical equipment shall comply with the provisions of 18.4 in GB 5226.1-2008.

4.7.8 Control action of self-stop mechanism, self-check mechanism, automatic control mechanism and safety device is sensitive and reliable, and the signal display is accurate.

#### 4.8 Power consumption

The power consumption of the main motor should be less than 60% of its rated power when machine running without load.

#### 4.9 Textile accessories

The wires used for cylinder and doffer shall conform to FZ/T 93038. The card clothing used for flat shall conform to FZ/T 93019.

#### 4.10 Noise

Noise of whole machine is as specified in table 3 when machine running without load.

Table 3

| Item | Parameters |            |
|------|------------|------------|
|      | Common     | High speed |
|      |            |            |

|  |        |        |
|--|--------|--------|
| Noise emission sound pressure level of whole machine/ dB (A) | ≤ 82.0 | ≤ 80.0 |
| The noise sound power level of whole machine / dB (A)        | ≤ 97.0 | ≤ 95.0 |

#### 4.11 Product painting

Product painting shall conform to FZ/T 90074.

#### 4.12 Card sliver quality

Unevenness of card sliver weight is as specified in table 4.

Table 4

| Item              |                     | Parameters   |                                     |   |                                     |   |                                     |
|-------------------|---------------------|--|-------------------------------------|---|-------------------------------------|---|-------------------------------------|
|                   |                     | Hopper feeding<br>(5 m segment)<br>(with autoleveller) |                                     | Lap feeding<br>(5 m segment)<br>(with autoleveller) |                                     | Hopper and lap feeding<br>(5 m segment)<br>(without autoleveller) |                                     |
| Varieties         |                     | Cotton fiber, cotton wool, hemp fiber                  | Chemical fiber, medium length fiber | Cotton fiber, cotton wool, hemp fiber               | Chemical fiber, medium length fiber | Cotton fiber, cotton wool, hemp fiber                             | Chemical fiber, medium length fiber |
| Weight unevenness | Internal unevenness | ≤ 1.5  | ≤ 2.0                               | ≤ 3.0   | ≤ 4.0                               | ≤ 4.0   | ≤ 5.0                               |
| CV value / %      | External unevenness | ≤ 2.5  | ≤ 3.0                               | ≤ 3.5   | ≤ 4.5                               | ≤ 4.5   | ≤ 5.5                               |

#### 4.13 Dust content in working area

Maximum 2.5 mg/m<sup>3</sup> for common type and maximum 1.5 mg/m<sup>3</sup> for high-speed type.

### 5 Test method

#### 5.1 Inspection method

5.1.1 Item in 4.1.2 is inspected according to FZ/T 93089.

5.1.2 Items in 4.2.1, 4.2.7, 4.3 are tested with vibration measurer or special frame dial gauge.

5.1.3 Items in 4.2.2, 4.2.4 are tested with dial indicator.

5.1.4 Item in 4.2.3 is inspected according to GB/T 9239.1-2006.

5.1.5 Item in 4.2.5 is inspected according to FZ/T 92029.

5.1.6 Flat deviation in 4.2.6 is measured with depth vernier caliper based on the side of bend.

5.1.7 Item in 4.2.8 is tested with stopwatch and tachometer.



5.1.8 Item in 4.2.9 is inspected according to FZ/T 93090.

5.1.9 Item in 4.4.2 is tested with point thermometer.

5.1.10 Item in 4.5 is inspected through visual observation after wiping with cotton or chemical fiber.

5.1.11 Electrical fast transient pulse immunity of the electrical equipment in item 4.7.1 is checked by electrical fast transient pulse generator, and the functional action of the inspected equipment should comply with the specified requirements.

Note: Test conditions are as follows: the peak value of interference test voltage output from power source terminal and PE terminal is 2 kV and the repetition frequency is 5 kHz or 100 kHz; the peak value of test voltage of input signal, output signal, data and control terminal are 1 kV and the repetition frequency is 5 kHz or 100 kHz.

5.1.12 Item in 4.7.2 is tested with electrostatic discharge generator.

Note: 8 kV contact discharge and 15 kV air discharge shall be used for test.

5.1.13 For item in 4.7.3, inspect if cable connection is firm; wires and cables between two terminals should not have any joints or splicing points.

5.1.14 For item in 4.7.4, inspect if each end of the wire is marked; the wire marked with color shall comply with the relevant provisions of GB 5226.1-2008.

5.1.15 Item in 4.7.5 is tested according to the provisions of 18.2.2 in GB 5226.1-2008, and the test data shall be determined according to the provisions of annex G in GB 5226.1-2008.

5.1.16 Item in 4.7.6 is tested with megohmmeter.

5.1.17 Item in 4.7.7 is tested with withstand voltage meter.

5.1.18 Item in 4.8 is tested with power meter.

5.1.19 Item in 4.9 is inspected according to FZ/T 93038 and FZ/T 93019.

5.1.20 In the case of the output speed 120 m/min for common type and 160 m/min for high-speed type after safety covers are tightly closed, item in 4.10 is tested according to the provisions of GB/T 7111.1 and GB/T 7111.2.

5.1.21 Weight unevenness of sliver in 4.12 is measured with sampling and weighing method:

—— Internal unevenness: minimum 5 samples (5 m segment) by intermittent sampling;

—— External unevenness: minimum 5 samples (5 m segment) for each machine by intermittent sampling; minimum 5 cards; minimum 30 samples in total.

Weight unevenness CV is calculated according to formula (1):

$$CV = \frac{1}{\bar{m}} \sqrt{\frac{\sum_{i=1}^n (m_i - \bar{m})^2}{n-1}} \times 100\% \quad \dots\dots\dots (1)$$

In the formula:

$m_i$ — mass of each sample in grams (g);

$\bar{m}$ — arithmetic mean value of each sample mass in gram (g);

$n$ — total number of samples.

5.1.22 In the case of normal dust extraction system and reasonable air conditioning, item in 4.13 is inspected according to GBZ/T 192.1—2007.

5.1.23 Other items are inspected through sensory organ.

## 5.2 Unloaded test

5.2.1 Test conditions:

a) Test of output speed and cylinder speed are as specified in table 5.

Table 5

| Item                               | parameters   |                 |
|------------------------------------|--------------|-----------------|
|                                    | Common type  | high yield type |
| Test output speed / (m/ min)       | 120          | 160             |
| Cylinder rotation speed / (r/ min) | 330x (1± 5%) | 400 x (1± 5%)   |

Note: The cylinder diameter is 1 290 mm.

b) Test duration: 2 h.

5.2.2 Check items: 4.1.1, 4.2.1, 4.2.6, 4.2.7, 4.2.8, 4.3 ~ 4.8, 4.10, 4.11.

## 5.3 Workload test

5.3.1 Test conditions:

a) Reasonably selects and adjusts process parameters such as gauge, speed, draft multiple, and selects appropriate wires rack for flat carding machine according to the trial spinning variety.

b) Working environment: temperature and humidity shall be in conformity with the technological requirements of textile mill.

c) Weight unevenness of lap should be in conformity with the requirements of table 6 when feeding by lap.

Table 6

| Item                               | parameters                               |  |
|------------------------------------|--|--|
|                                    | Cotton fiber, cotton wool,<br>hemp fiber | chemical fiber, medium length<br>fiber |
| Longitudinal weight unevenness / % | ≤ 1.0                                    | ≤ 1.3                                  |
| Transversal weight unevenness / %  | ≤ 2.0                                    | ≤ 3.0                                  |

d) Weight unevenness of fibrous layer should be in accordance with the requirements in FZ/T 93089 when feeding by hopper.

e) Test duration: continuous production operation for 72 hours.

5.3.2 Check items: 4.5, 4.12, 4.13.

## 6 Inspection rules

### 6.1 Type inspection

6.1.1 Type inspection for product shall be conducted under one of the following conditions:

- a) New product appraisal;
- b) Big changes in structure, material and process may affect the product performance during production;
- c) Big difference between the ex-factory inspection result and the last type inspection occurs;
- d) When the production is resumed after shutdown more than two years;
- e) Quality inspection by the third party.

6.1.2 Inspection items: chapter 4.

### 6.2 Ex-factory inspection

6.2.1 Products shall not leave the factory until at least one machine fully assembled in each batch of products is taken out for operation test without load at the same time, further inspected by the quality inspection department of the enterprise and attached with the product qualified certificate.

6.2.2 Inspection items: 4.1 ~ 4.11.

### 6.3 Judgement rules

This product shall be judged to comply with the requirements of the standard after all item inspections are qualified.

### 6.4 Others

IF any item not conforming to this standard is found during installation and debugging, manufacturer shall handle it together with customer.

## 7 Marking

7.1 The storage and transportation pictorial marks on packing box shall be in accordance with the provisions of GB/T 191.

7.2 Product nameplate shall be in accordance with the provisions of FZ/T 90089.1 and FZ/T 90089.2.

7.3 Product safety signs shall be in accordance with the provisions of GB 2894.

## 8 Packaging, transportation and storage

8.1 Packaging of the products shall comply with the requirement in FZ/T 90001.

8.2 Packing box shall be placed in the specified direction, and shall not be tilted or changed in direction during transportation of the product.

8.3 Moisture-proof and rust proof period of the product in the packing box after leaves the factory is one year under the good rainproof and ventilated storage conditions.