Comments to “The Bank of Russia Notes Fitness Criteria”

Commercial banks and their branches are not allowed to supply their customers with banknotes and are to deliver the said banknotes to the Bank of Russia Cash Centers if these banknotes have defects stated in the Annex to the Bank of Russia Regulation No.2405 of February 27, 2010 “Amendment to the Bank of Russia Regulation No.318-P of April 24, 2008 “On the procedure of cash operations, principles of storing, transporting and collecting the Bank of Russia notes and coins in the commercial banks on the territory of the Russian Federation” registered by the Ministry of Justice of the Russian Federation No.16687 on March 23, 2010.

The stated requirement is applied to banknotes processed by sorting machines (which are capable of checking machine-readable security features on the Bank of Russia notes and which are capable of sorting banknotes as fit and unfit) and banknotes accepted by cashiers from customers on the basis of “note-by-note” counting, which are meant to be re-issued over the counter with customers during the business hours as individual banknotes.

The recommendations listed below will be considered in the tests of banknote-sorting machines at the Service Centre of the Bank of Russia.

1. The following legal tender banknotes should be classified as unfit:

1.1. Banknotes which have a soiling of the surface of the front and/or the reverse side reducing the brightness of the image by 8 percent and more. The value of brightness reduction can be measured with the use of any spectrophotometric or colourimetric colour measurement devices allowing to convert measurement results into the CIE Lab colour system, or by visual comparison with the Bank of Russia notes, which have the stated soiling level determined with the help of the above mentioned devices;

Banknote soiling means an even general spread of dirt on the front or the reverse side of a banknote without any localized contrasting darkened areas (stains).

For the visual determination of the soiling level of a banknote it is recommended to use as a basis for comparison banknotes the soiling level of which is stated in paragraph 1.1 (hereinafter referred to as Comparative Banknotes).

Comparative Banknote Preparation

ΔL^*, the reduction of the parameter L^* of the CIE Lab colour system should be used as a quantitative parameter, determining the soiling level of banknotes. In the Russian technical documentation on measuring devices this parameter can have different names – lightness, luminosity etc. – depending on the translation. The Bank of Russia doesn't limit the list of measuring devices, which can be used for measuring L^* in the CIE Lab system. It is recommended to use devices assigned for measuring paper or printing production features.

The percentage of the decrease of this parameter for each denomination is measured against L_0^* (initial value), defined for freshly printed banknotes of corresponding denomination taken from the "Goznak"-packed bundles.

The measurements are recommended to implement on the non-printed area (fig. 1). First, the banknote should be positioned on a pile of white paper (not less than 10 sheets). The measurements should be made in the visible spectral gamut. The number of measurements – depending on the diameter of a single-measured spot-area provided by the device – should be selected in a way allowing to get reliable data for the area pointed in fig. 1. For example, if the diameter of a single spot-area needed to be measured is 4 mm it is recommended to make not less than 10 measurements in different places of the area outlined in fig. 1, and then to calculate the average.

Fig. 1

ΔL^*, the reduction of parameter L^* can be estimated with the help of the following equation:

$$\Delta L^* = \frac{L_0^* - L^*}{L_0^*} \cdot 100\%, \text{ where}$$

L_0^* (initial value) is a parameter for freshly printed banknotes, taken from the "Goznak"-packed bundles. (Freshly printed banknotes of the same denomination from different "Goznak"-packed bundles can have different values of L_0^*. The maximum value of L_0^*, corresponding to the lightest freshly printed banknotes, should be used for calculations.)

L^* – a parameter for a soiled banknote.

1.2. Banknotes which have one or more tears at the edge, if the length of at least one of them is equal or greater than 7 mm;

When sorted out on the basis of this criterion, banknotes with one or more tears at the edges should be classified as unfit if the length of at least one of such tears is equal or greater than 7 mm.

The length of a tear deems equal to a straight line drawn from the end of the tear perpendicularly (at the right angle) to the edge of the banknote intersected by this tear.

Banknotes with several tears which have the length shorter than 7 mm may be classified as unfit at the discretion of a commercial bank.

Fig. 2

Taking into account that most of banknote sorting machines are not able to identify edge tears in cases when banknotes do not have any missing parts, such banknotes with edge tears may be classified as fit by sorting machines.

To minimize the number of banknotes with such defects it is therefore recommended to set the sorting machines threshold of a missing area as equal to the area of a right-angled triangle with legs equal to 7 mm and 2 mm (fig. 2).

1.3. Banknotes which have one or more through holes (punctures), if a diameter of at least one of them is equal or greater than 4 mm;

To classify a banknote as unfit on the basis of this criterion such banknote should have one or more through holes, and the diameter of at least one of them should be equal or greater than 4 mm.

Banknotes with several holes of smaller diameters may be sorted as unfit at the discretion of a commercial bank.

If the banknote has a through hole with a non-round shape, an average diameter can be determined by the following equation according to the explanations in fig. 3:

$$d_{avg} = \frac{d_{\min} + d_{\max}}{2}.$$

Fig. 3

When banknotes are processed on sorting machines, the setting of these machines should be programmed so that banknotes with multiple holes with a total area of 12 mm^2 and more be classified as unfit.

1.4. Banknotes which have one or more missing corners if the area of at least one of them is equal or greater than 32 mm^2;

To classify a banknote as unfit on the basis of this criterion such banknote should have at least one missing corner with the area of 32 mm^2 or more.

Banknotes which have several missing corners with smaller areas may be classified as unfit at the discretion of a commercial bank.

The area of a missing corner can be estimated by the following equation according to the explanations in fig. 4:

$$S = 1/2 \cdot a \cdot b$$

Fig. 4

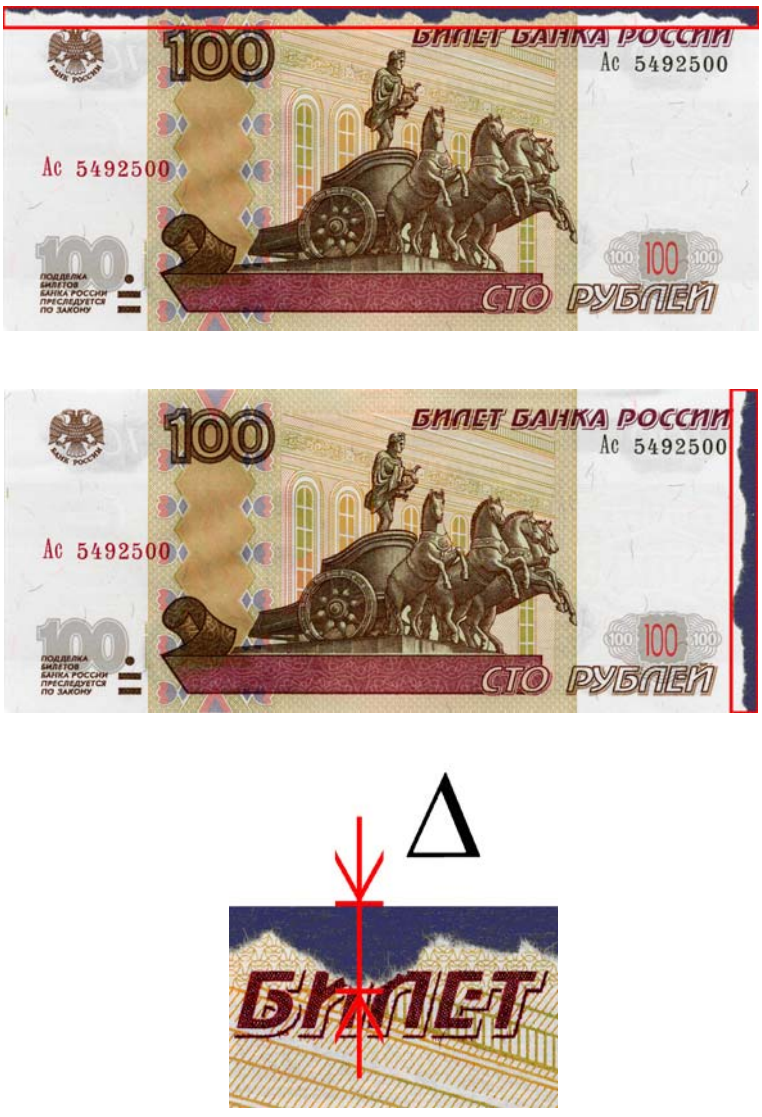
If a sorting machine can distinguish between dog ears and missing corners, the presence of a dog-ear shouldn't be a reason for classifying such banknote as unfit.

1.5. Banknotes which have one or more missing edges reducing the length or width of such banknotes by at least 5 mm;

When sorted out on the basis of this criterion, banknotes which have one or more missing edges (with two missing corners on one side) should be sorted as unfit. Some examples of banknotes with missing edges are shown in fig. 5.

The size of a missing part should be determined according to the maximum value of Δ as shown in fig. 5.

Fig. 5



1.6. Banknotes which have one or more unauthorized inscriptions consisting of two or more signs (characters);

Banknotes which have one or more unauthorized inscriptions consisting of two or more signs (characters) should be sorted as unfit irrespective of the fact if the inscription is contrasting or not and if it is made in ink or by pencil.

Banknotes with inscription consisting of two or less signs (characters), of a big size, or highly contrasting inscriptions may be sorted as unfit at the discretion of a commercial bank.

Some examples of the banknotes with inscriptions that should be sorted as unfit are shown in fig. 6.

Fig. 6

Machine sorting by this criterion can be conducted if the sorting machine has corresponding characteristics.

In other cases inscriptions can be regarded as stains and settings of sorting machines should comply with the setting requirements recommended for sorting banknotes with stains.

1.7. Banknotes which have one or more unauthorized images (drawings, stamps imprints);

Some examples of banknotes with drawings and stamp imprints that should be sorted as unfit are shown in fig. 7.

Machine sorting by this criterion can be conducted if the sorting machine has a corresponding sensor detector.

In other cases such images can be regarded as stains and settings of sorting machines should comply with the setting requirements recommended for sorting banknotes with stains.

Fig. 7

1.8. Banknotes which have one or more contrasting stains, if the diameter of at least one of them is equal or greater than 5 mm;

To consider a banknote unfit on the basis of this criterion such banknote should have at least one stain with the diameter of 5 mm or more.

Banknotes with several stains with diameters less than 5 mm may be sorted as unfit at the discretion of a commercial bank.

If a banknote has a stain of a non-round shape, its average diameter can be calculated by following equation according to the explanations in fig. 8:

$$d_{avg} = \frac{d_{\min} + d_{\max}}{2}.$$

If banknotes are processed by sorting machines it is recommended to set the stain area as a sorting parameter. Banknotes with stains should be sorted as unfit if the area of the stain is 20 mm^2 and more.

Fig. 8

1.9. Banknotes which have a visually recognizable lack of ink as a result of wear and/or decolouration;

Some examples of unfit and partially de-inked banknotes are shown in fig. 9.

Banknotes which have a lack of ink on the whole surface or on the part of it as shown in the examples in fig. 9 (or with more significant lack of ink) should be sorted as unfit.

Fig. 9

1.10. Banknotes which have at least one defect of integrity repaired by adhesive tape.

When sorted by this feature banknotes with at least one defect repaired by adhesive tape should be classified as unfit.

Some examples of banknotes which should be sorted as unfit on the basis of this feature are shown in fig. 10.

Fig. 10