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(71) Applicant : **SUMITOMO RUBBER INDUSTRIES LIMITED**
1-1 Tsutsuicho 1-chome Chuo-ku
Kobe-shi Hyogo-ken (JP)

(72) Inventor : **Maruoka, Kiyoto**
3-7-24, Karibadai, Nishi-ku
Kobe-shi, Hyogo-ken (JP)

(74) Representative : **Allard, Susan Joyce et al**
BOULT, WADE & TENNANT, 27 Furnival Street
London EC4A 1PQ (GB)

(54) **Coated golf ball.**

(57) A coated golf ball comprising a golf ball and a yellowish enamel paint layer thereon, wherein the enamel paint layer has a "b" reading of 30 or more in Lab color difference determined by a colorimeter, and a difference in the "b" reading between the surface of the golf ball and the yellowish enamel paint layer of 15 or less.

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The present invention relates to a coated golf ball. In particular, it relates to a coated golf ball having a yellowish enamel layer on its surface, which does not show a remarkable color change even when the enamel layer is damaged or worn out.

A golf ball is known which is coated with a yellowish enamel coating. However, when the enamel coat on the surface of the golf ball is damaged or worn out the golf ball's surface is exposed, the exposed surface having a different color from the enamel coating, thus degrading the golf ball. This is worse for a golf ball which is coated with a yellow enamel coating.

There has been no technique for solving the above drawback of the yellow golf ball.

We have found that the degrading is significantly lightened or reduced by controlling the yellowish color of the enamel coating and the color difference between the enamel coating and the surface of the golf ball.

The main object of the present invention is to provide a coated golf ball coated with a yellowish enamel paint, which maintains a good appearance for a long period of time thus improving it's commercial value.

This object as well as other objects and disadvantages of the present invention will become apparent to those skilled in the art from the following description.

According to the present invention, there is provided a coated golf ball having a yellowish enamel paint layer thereon, the enamel paint layer having a "b" reading of 30 or more in Lab color difference determined by a colorimeter, and a difference in the "b" reading between the surface of the golf ball and the yellowish enamel paint layer of 15 or less.

The Lab color difference is calculated as described in the following equations, using tristimulus values (X, Y and Z) according to JIS Z8701 or JIS Z8728.

$$L = 116(Y/Yn)^{1/3} - 16$$
$$a = 500[(X/Xn)^{1/3} - (Y/Yn)^{1/3}]$$
$$b = 200[(Y/Yn)^{1/3} - (Z/Zn)^{1/3}]$$

wherein Xn, Yn and Zn are the tristimulus values in the XYZ system of a perfect diffuse reflection surface.

According to the above equations, the "L" reading represents lightness and the "a" and "b" readings represent chromaticity. Particularly, the "a" reading represents a red-green direction and the "b" represents a yellow-blue direction. Further, when the "L" reading becomes larger, the lightness becomes larger. When the "a" reading becomes larger, the color becomes red. When the "b" reading becomes larger, the color becomes yellow.

In the present invention, the Lab color difference is measured, using a colorimeter (commercially available from Minolta Co. as CR-221).

The enamel paint used in the present invention is characterised by a yellowish color (b reading $\geqq$ 30). It is preferred that the difference in the "b" reading between the surface of the golf ball and the yellowish enamel paint layer should be 15 or less, particularly 10 or less. When the "b" reading is not in the above range, the durability of appearance of the golf ball is inferior and the commercial value becomes lower. In the present invention, it is enough to control only the "b" reading. In addition to this, the "L" and "a" readings may be optionally controlled.

It is preferred that the "L" reading is larger than 70 and that the difference in the "L" reading between the surface of the golf ball and the yellowish enamel paint is 10 or less. When the "L" reading is not within the above range, the durability of the appearance of the golf ball is inferior and the commercial value becomes lower just as for the "b" reading. Furthermore, it is preferred that the "a" reading is also controlled. It is preferred that the difference in the "a" reading between the surface of the golf ball and the yellowing enamel paint is 10 or less, particularly 5 or less. When the "a" reading is not within the above range, the durability of appearance of the golf ball is inferior and the commercial value becomes lower just as for the "b" and "L" readings.

By changing the conditions such as the type and amount of pigment to be formulated, the surface of the golf ball and the enamel film can be controlled within the above-mentioned "Lab" reading range.

The golf ball which is used in the present invention is not specifically limited, and examples thereof include a golf ball produced by vulcanizing a rubber composition comprising a base rubber and a co-crosslinking agent, a golf ball wherein ionomer resin is used a cover and a golf ball wherein balata rubber is used as a cover. It is more preferred that the cover is colored yellow and controlled to the above mentioned "Lab" reading ranges.

The coating method of the enamel paint on the surface of the golf ball is not specifically limited in the present invention, and examples thereof include air gun coating, electrostatic coating and the like. It is preferred that a thickness of an enamel film obtained by the above coating method is 3 to 50 μm, particularly 10 to 30 μm.

The golf ball of the present invention does not show remarkable color change even when the enamel layer is damaged or worn out. Therefore, these golf balls are very useful for golf balls for driving ranges.

EXAMPLES

The following Examples further illustrate the present invention in detail but are not to be construed to limit the scope thereof.

Examples 1 to 8 and Comparative Examples 1 to 8

By using the following formulation, a one piece golf ball was made.

Component	Amount (parts by weight)
Hi-cis polybutadiene	100
Zinc oxide	23
Methacrylic acid	24
Dicumyl peroxide	1.5
Pigment, LB305 (yellow) and LB045 (red) manufactured by Sumika Color Co.	0.001 to 3.0

The formulation components were kneaded and vulcanized at 160 °C for 30 minutes to obtain a one piece golf ball. "Lab" reading of the golf ball was adjusted with a predetermined amount of the pigment to obtain a golf ball before coating shown in Tables 1 and 2.

The golf ball was subjected to shot blasting and rinsed with alcohol. After drying, it was coated with urethane paint becomes such that a film thickness becomes 20 μm. The paint basically had the following formulation.

Components	Parts by weight
Base resin (polyester polyol)	100
Titanium dioxide	40
Chrome yellow	110
Thinner	250

A curing agent was prepared by mixing 100 parts by weight of a polyisocyanate curing agent and 45 parts by weight of thinner and formulated into the above paint formulation to constitute 55 parts by weight of the solid content of the curing agent based on 100 parts by weight of the base resin. The "Lab" reading of the paint was adjusted by slightly changing the amount of the pigment as shown in Table 1 and 2. The "Lab" reading was measured, using a colorimeter CR-221 (manufactured by Minolta Co.).

After a roll mill containing a stone, a golf ball and water was rotated at 150 rpm for 5 hours, ball appearance was observed as follows. The results are shown in Tables 1 and 2.

Table 1

	Ex.1	Ex.2	Ex.3	Ex.4	Ex.5	Ex.6	Ex.7	Ex.8
Before coating								
a	-6.85	-7.42	-7.93	2.75	-8.50	-9.30	-9.52	1.87
b	89.54	80.21	68.54	80.54	54.10	43.50	35.02	42.74
L	84.89	85.51	86.91	84.92	87.94	88.19	90.42	88.56
After coating								
a	-5.23	-5.23	-5.23	-5.23	-6.87	-6.87	-6.87	-6.87
b	81.40	81.40	81.40	81.40	45.02	45.02	45.02	45.02
L	84.78	84.78	84.78	84.78	88.56	88.56	88.56	88.56
Results*	A	A	B	B	B	A	A	B

*: A: The exposed part of an enamel paint is hardly observed.

B: The exposed part of an enamel paint is observed by taking a ball in hands.

C: The exposed part of an enamel paint is observed even from a distance of 2 to 3 m.

D: The exposed part of an enamel paint is clearly observed.

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Table 2

		Comp. Ex.1	Comp. Ex.2	Comp. Ex.3	Comp. Ex.4	Comp. Ex.5	Comp. Ex.6	Comp. Ex.7	Comp. Ex.8
Before coating									
	a	-6.74	-5.39	7.22	-5.10	-10.85	-6.77	6.55	-6.77
	b	64.52	98.32	82.13	82.96	27.42	62.21	42.13	44.33
	L	86.71	81.21	85.33	72.33	91.10	86.98	88.03	76.33
After coating									
	a	-5.23	-5.23	-5.23	-5.23	-6.87	-6.87	-6.87	-6.87
	b	81.40	81.40	81.40	81.40	45.02	45.02	45.02	45.02
	L	84.78	84.78	84.78	84.78	88.56	88.56	88.56	88.56
Results		D	D	D	D	D	D	D	D

Claims

1. A coated golf ball comprising a golf ball having a yellowish enamel paint layer thereon, the enamel paint layer having a "b" reading of 30 or more in Lab color difference determined by a colorimeter, and a difference in the "b" reading between the surface of the golf ball and the yellowish enamel paint layer of 15 or less.

2. A coated golf ball as claimed in Claim 1 wherein the difference in the "b" reading between the surface of the golf ball and the yellowish enamel paint layer is 10 or less.

3. A coated golf ball as claimed in Claim 1 or Claim 2 wherein the enamel paint layer has an "L" reading of above 70 and a difference in the "L" reading between the surface of the golf ball and the yellowish enamel

paint of 10 or less.

4. A coated golf ball as claimed in any one of the preceding Claims wherein the difference in the "a" reading between the surface of the golf ball and the yellowish enamel paint is 10 or less.

5. A coated golf ball as claimed in any one of the preceding Claims wherein the golf ball is a golf ball produced by vulcanizing a rubber composition comprising a base rubber and a co-crosslinking agent, a golf ball in which an ionomer resin is used as the cover or a golf ball in which balata is used as the cover.

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EUROPEAN SEARCH REPORT

Application Number
EP 93 30 2077

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	US-A-4 802 674 (KITAOH) * column 1, line 9 - line 20 * * column 2, line 12 - line 59; claim 1; figure 1 *	1,5	A63B37/00 A63B37/12
A	US-A-4 798 386 (BERARD) * column 2, line 63 - column 3, line 8; claim 1; example 1 *	1	
A	EP-A-0 452 794 (WILSON SPORTING GOODS COMPANY) * column 2, line 11 - line 35; claims 1,6; figure 1 *	1,5	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

A63B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
BERLIN	25 JUNE 1993	MICHELS N.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
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E : earlier patent document, but published on, or after the filing date
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