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| AA 598 02   | CORPORATE PURCHASING SPECIFICATION |  |
| Rev. No. 05 |                                    |                                                                                     |
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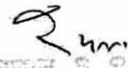
**8.9.3 Change In Volume :**  
8% , maximum.

**9.0 Keeping Property :**  
When stored under cover in a dry place in the original packing under normal temperature conditions, the material shall retain the properties prescribed in this specification for a period of not less than 24 months after the date of manufacture which shall not be earlier than one month of the scheduled delivery date mentioned in BHEL order.  
The expiry date shall be marked clearly on each sheet/gasket/strip

**10.0 TEST CERTIFICATES :**  
Unless otherwise stated three copies of test certificates shall be supplied along with each consignment.  
In addition, the supplier shall ensure to enclose one copy of test certificates along with their despatch documents/packing or shipping list to facilitate quick clearance of the material. The test certificates shall bear the following information  
AA 59 802 (Rev 05) : Synthetic Rubber Bonded Cork Sheets Strips & Gaskets.  
BHEL Order No.  
Batch/lot no.  
Manufacturer's / Supplier's name and grade.  
Trade mark, if any.  
No. of sheets/gaskets/strips supplied.  
Size of sheet/strip  
Drawing No. and item No (for Gaskets).  
Date of manufacture and expiry  
Tests Results of clauses 4,6 and 8.

**11.0 PACKING AND MARKING**  
The material shall be suitably packed to prevent damage during transit. Each package shall be legibly marked with the following information.  
Individual sheet, strip at an interval of one meter and gasket shall be marked with supplier's Trade mark and Date of expiry using a permanent legible marking.  
AA 59802 : Synthetic Rubber Bonded Cork Sheets, Strips & Gaskets.  
BHEL Order No  
Batch / lot no.  
Manufacturer's/Supplier's name and grade.  
Trade mark, if any  
No. of sheets/gaskets/strip supplied.  
Size of sheet/Strip  
Drawing No. and item No (for Gaskets).  
Date of manufacture and expiry

**12.0 REFERRED STANDARDS (Latest publications including amendments) :**  
1) IS : 3400 2) IS: 4253

  
 प्रमुख अधिकारी S. S. Misra  
 प्रमुख अधिकारी (प्रा.प.) Sr. B. (P.P.)  
 प्रमुख अधिकारी BHEL  
 प्रमुख अधिकारी BHEL

**CORPORATE PURCHASING SPECIFICATION**

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- 8.2 Compression Set  $110 \pm 2^\circ \text{C}$ , (IS : 3400 - Part X) :**  
85% maximum when tested on small type test specimens, except that duration of test shall be 24, +0, -2 hours and recovery time shall be 1 hour.
- 8.3 Tensile Strength (IS : 4253-Part II) :**  
1.5 N/mm<sup>2</sup>, min.
- 8.4 Flexibility (IS : 4253-Part II) :**  
There shall be no breakage though the granules of cork or separation of the granules.
- 8.5 Compressibility And Recovery (IS : 4253-Part II) :**  
Compressibility : 20 to 35%  
Recovery : 80% Minimum.  
Thickness of test piece shall be thickness of sheet/strip under test except that for sheet/strip of less than 6mm thickness sufficient no. of test pieces shall be stacked so as to built up thickness upto at least 6 mm.
- 8.6 pH Value of 5% Aqueous Extract (IS : 4253-Part II) : 5 to 8.5.**
- 8.7 Density (Weight/Volume Method) : 0.65 to 0.9 g/cc.**  
Test shall be carried out on a sample of size 50 cm<sup>2</sup> Min.
- 8.8 Side Flow Under Compression (For 6 mm thick sheets/strips and above) :**  
18% Max.  
Test shall be carried out on a sample of size 22 mm dia disc (4 cm<sup>2</sup>). This is compressed by 40% between the machined oil free flanges of a press at ambient temperature and diametric side flow shall be measured. The load shall be increased at a uniform rate to achieve 40% compression which shall be reached within 30±10 seconds, after which the load shall be maintained for a further period of 30±5 seconds. The side flow measurement shall be immediately determined. Thickness of test piece shall be thickness of sheet/strip under test.
- 8.9 Ageing In Oil :**  
Two test specimens of size at least 50 cm<sup>2</sup> and three test specimens of size 25 mm wide and 200 mm length from each direction in case of sheet & in longitudinal direction only for strips (for flexibility test) shall be cut from each sheet/strip in the sample from widely separated positions. The specimens shall be aged in insulating oil conforming to IS : 335 at  $90 \pm 2^\circ \text{C}$  for  $72 \pm 1$  hour. After the oil is wiped by blotting paper. The specimens shall show the following properties.
- 8.9.1 Finish :**  
Shall be free from cracks and blisters and there shall not be any disintegration of rubber and cork.
- 8.9.2 Flexibility :**  
There shall be no breakage through the granules of cork or separation of granules.

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105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000



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4.2.1.2 For Strips  
Width :  $\pm 0.5$  mm, Length :  $\pm 10.0$  mm

4.2.1.3 On Thickness :  
The permissible variation in thickness at any point on the sheet shall be as given below :

| Thickness, mm | Tolerance     |
|---------------|---------------|
| UP to 2.5     | $\pm 10 \%$   |
| Above 2.5     | $\pm 0.25$ mm |

5.0 MANUFACTURE :

Cork sheets manufactured by moulding and slicing process only are acceptable. 100/150 mm thick block is first moulded and cured under temperature and pressure. Then individual thickness are cut from the block on the slicing machine. Raw materials used shall be free from all impurities such as hard board, wood flour, dust, metallic particles and other foreign materials which may be detrimental to the serviceability of the gaskets. The material shall be capable of being cut or punched without cracking or tearing and shall have very good oil resistant properties.

Note :

- 1) Cork sheets manufactured by moulding individual thicknesses are not acceptable.
- 2) Fresh cork granules shall be used and grain size shall preferably be Fine. i.e. passing through 1.00 mm IS sieve and retained by 425 micron IS sieve.

6.0 FINISH

Shall be uniform in texture and colour, free from cracks and shall have a smooth finish.

7.0 TEST SAMPLES :

Following test samples in ordered thickness shall be supplied for testing

7.1 Sheets : 300 X 300 mm : 3 Nos

7.2 Strip : 2 metre long 1 No in ordered width

7.3 Gaskets : 300 X 300 mm : 3 Nos, from the sheet used for making gaskets with proper correlation, along with 3 gaskets.

8.0 PROPERTIES :

When tested in accordance with the methods shown against each, the test samples shall show the following properties :

8.1 Hardness (IS : 3400-Part II) :  
60 to 80 IRHD

5/10/2010  
 10/10/2010  
 11/10/2010  
 12/10/2010

## SYNTHETIC RUBBER BONDED CORK SHEETS, STRIPS & GASKETS

## 1.0 GENERAL:

This specification governs the quality requirements of flexible resilient synthetic rubber bonded cork sheets-and-strips gaskets composed of uniformly granulated cork bonded with synthetic rubber of nitrile butadiene or neoprene rubber or a suitable mixture of these two.

## 2.0 APPLICATION :

Used as gasket material in transformers, switchgears, bushings, oil rigs etc.

### 3.0 COMPLIANCE WITH NATIONAL STANDARDS:

There is no National Standard covering this material. However, assistance has been drawn from the following National Standard.

IS : 4253-Part 2-1980 (Reaffirmed 1989)  
Gr : RC 70 C

### Cork Composition Sheets - Cork And Rubber.

#### 4.0 DIMENSIONS AND TOLERANCES :

#### 4.1 Sizes :

Length width and thickness of the sheet/strip shall be stated on the order. All the four edges of the sheet/strip shall be uniformly trimmed. Gaskets shall be supplied as per drawing accompanying the order.

Preferred Dimensions are given below :

### Thickness

1, 1.5, 3, 5, 6, 10, 12, 15, 16 mm.

**Width : Sheet : 610 & 925 mm, Strip : 60 mm.**

**Length / Sheet : 915mm. Strip : 20 metre without joints**

#### 4.2 Tolerances:

Unless otherwise stated on the order/drawing, tolerances shall be as given below :

#### 4.2.1 On Length and Width :

#### 4.2.1.1 For Sheets

**Length and width : + 3mm**

**Revisions : TRE/JS/STDS/607D/GPS**  
**dt:28.09.01 from Jhansi**

**APPROVED :**  
**INTERPLANT MATERIAL**  
**RATIONALISATION COMMITTEE-MRC (C)**

|               |         |            |                    |                     |                                          |
|---------------|---------|------------|--------------------|---------------------|------------------------------------------|
| Rev. No. 05   | Amd.No. | Reaffirmed | Prepared<br>BHOPAL | Issued<br>Corp. R&D | Dt. Of 1 <sup>st</sup> Issue<br>Jan. '80 |
| Dt.: 15-12-01 | Dt :    | Year :     |                    |                     |                                          |



Indian Standard (Reaffirmed 1999)

## SPECIFICATION OR CORK COMPOSITION SHEETS

## PART II CORK AND RUBBER

(First Revision)

**1. Scope** — Specifies requirements for cork composition sheets for gaskets made by the compounding of granular cork with natural or synthetic rubber.

**1.1** Three types of sheets are covered, and within each type, three grades. Type A is non-oil resistant, Type B has a good resistance to oil and Type C has a very good resistance to oils and petrols.

**2. Material and Finish** — The cork used for the manufacture of cork composition sheets shall be clean soft grade type uniformly granulated and practically free from hardboard, wood flour, dust, and other foreign material likely to be detrimental to the serviceability of the gaskets. The finished material shall be free from cracks or pinholes and shall be capable of being cut or punched without cracking or tearing.

**2.1** Unless a particular grain size is specified by the purchaser, the size of the cork granules used shall be that which the manufacturer considers most suitable for the particular application. The granules shall be classified as follows:

- a) Fine Passing through 1.00-mm IS Sieve and retained on 425-micron IS Sieve
- b) Medium Passing through 2.00-mm IS Sieve and retained on 1.00-mm IS Sieve
- c) Coarse Passing through 3.35-mm IS Sieve and retained on 2.000-mm IS Sieve

**Note** — For the Indian Standard Sieve designations and their equivalents according to BS, ASTM, Tyler, French and German Standards [see IS : 460 (Part I) - 1978 Specification for test sieves, Part I Woven and welded wire screens (second revision), and IS : 460 (Part II) - 1978 Specification for test sieves, Part II Perforated plates (second revision)].

**3. Thickness** — The thickness of the sheets shall be as specified by the purchaser.

**3.1** The permissible variation in thickness at any point on the sheet shall be  $\pm 10$  percent, for thickness up to 2.50 mm and  $\pm 0.25$  mm for thickness above 2.50 mm.

**4. Types and Grades** — The various types and grades of cork composition shall be identified by the designations given in Table 1, in accordance with their properties.

**5. Properties** — Cork composition sheets, when subjected to the conditioning procedure and the appropriate test as given in 7 shall have the properties given in Table 1.

**6. Sampling** — Unless otherwise agreed between the supplier and the purchaser, sampling plan as given in Appendix A shall be followed.

### 7. Tests

**7.1 Conditioning** — All test samples shall be conditioned in a standard atmosphere of  $65 \pm 2$  percent relative humidity at  $27 \pm 2^\circ\text{C}$  for 48 hours prior to testing. Testing is preferably carried out in the standard atmosphere and shall be so performed in cases of dispute.

**7.2 Dimensions** — The thickness shall be measured by Grade 2 micrometer having an anvil of not less than 10 mm diameter (see IS : 2967-1964 Specification for external micrometers). The thickness shall be within the variation specified at 3.1.1.

### 7.3 Dimensional Stability

**7.3.1** One test specimen at least of size  $150 \times 150$  mm shall be drawn from each sheet in the sample. Test specimens shall be subjected to not less than 96 percent relative humidity at  $50 \pm 2^\circ\text{C}$

Adopted 26 June 1980

October, 1980 BIS

Gr 3

BUREAU OF INDIAN STANDARDS  
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG  
NEW DELHI 110002

## APPENDIX A

( Clause 6.1 )

## SCALE OF SAMPLING AND CRITERIA FOR CONFORMITY

## A-1. Scale of Sampling

**A-1.1 Lot** — In any consignment, all the cork composition sheets of the same dimensions, type and grade shall be grouped together to constitute a lot.

**A-1.2** For ascertaining the conformity of the lot to the requirements of this standard, tests shall be carried out from each lot separately. The number of cork composition sheets to be selected at random for this purpose shall be according to col 1 and 2 of Table 2.

**A-1.2.1** To ensure the randomness of selection, random number tables as agreed between the buyer and the supplier, shall be used. In case the tables are not available, the following procedure may be followed:

Starting from any item in the lot, count all the items in one order as 1, 2, 3 ....., etc, up to  $r$  and so on, where  $r$  is the integral part of  $N/n$  ( $N$  being the number of items in the lot and  $n$  the number of items to be selected). Every  $r$ th item thus counted shall be withdrawn to constitute the sample.

**A-1.2.2** If the cork composition sheets are packed in different packages, a suitable number of packages (not more than 20 percent of the total in the lot) shall be selected at random and the required number of cork composition sheets shall be drawn, as far as possible, equally from the packages selected.

TABLE 2 SAMPLE SIZE AND CRITERIA FOR CONFORMITY

( Clauses A-1.2, A-2.1, A-2.2 and A-2.3 )

| Number of Sheets in the Lot | For Dimensions |                      | Sample Size for Tensile Strength, Compressibility and Recovery, Compression Set and Flexibility | Sample Size for Other Characteristic |
|-----------------------------|----------------|----------------------|-------------------------------------------------------------------------------------------------|--------------------------------------|
|                             | Sample         | Permissible Defects* |                                                                                                 |                                      |
| Up to 500                   | 13             | 1                    | 5                                                                                               | 2                                    |
| 501 " 1 000                 | 20             | 1                    | 5                                                                                               | 3                                    |
| 1 001 " 3 000               | 32             | 2                    | 10                                                                                              | 4                                    |
| 3 001 " 10 000              | 50             | 3                    | 10                                                                                              | 5                                    |
| 10 001 and above            | 80             | 5                    | 15                                                                                              | 5                                    |

\*This ensures that lots containing 2.5 percent or less defectives will be accepted most of the times.

## A-2. Number of Tests and Criteria for Conformity

**A-2.1** The cork composition sheets selected according to A-1.2.1 or A-1.2.2 shall be examined for dimensions. If the number of cork composition sheets found not in conformity with the specified requirements, is less than or equal to the corresponding number given in col 3 of Table 2, the lot shall be declared conforming to the requirements for dimensions.

**A-2.2** In cases of those lots which have been found satisfactory according to A-2.1, a number of cork composition sheets equivalent to sample size indicated in col 4 of Table 2 shall be selected from those already selected according to A-1.2. These shall be subjected to the tests for tensile strength, compressibility and recovery, flexibility and compression set. The lot shall be declared conforming to the above requirements if all the cork composition sheets satisfy the relevant requirements.

**A-2.3** In case of those lots which have been found satisfactory according to A-2.2, a number of cork composition sheets equivalent to sample size indicated in col 5 of Table 2 shall be selected from those already selected according to A-2.2. These sheets shall be subjected to the tests for dimensional



for  $4 \pm \frac{1}{2}$  hours without condensation occurring on the specimens. After cooling to room temperature at not less than 96 percent relative humidity and maintaining these conditions for 12 to 24 hours the length  $a$  of the specimen shall be measured to within 0.25 mm, care being taken that no deformation of the specimen takes place during measurement.

7.3.2 The specimen shall then be dried at  $105 \pm 2^\circ\text{C}$  for 22 to 24 hours, cooled in drying oven ( or in a desiccator ) and the length  $b$  after drying shall be measured.

### 7.3.3 Calculation

$$\text{Dimensional stability ( percent )} = \frac{a - b}{b} \times 100$$

where

$a$  = length after cooling at 96 percent relative humidity, and

$b$  = length after drying.

7.4 *Tensile Strength* — Three test specimens shall be cut from each sheet in the sample and tested for tensile strength on a tensile testing machine. The specimens shall be cut with a die or other suitable means to give clean cut edges. The specimens shall be 25 mm wide and 100 mm long and there shall be at least 30 mm grip in each jaw. The rate of traverse of jaw shall be  $300 \pm 30$  mm/min. Load shall be applied and tensile strength calculated in kPa\*. Where the test specimen breaks at the jaws the readings shall be disregarded. The value of tensile strength shall not be less than that specified in Table 1 for that type and grade.

7.5 *Compressibility and Recovery* — This shall be determined on any convenient apparatus which has two flat parallel platens overlapping the test specimen by at least 6 mm at any time between which the material can be placed and compressed and the movement of which shall be measured with a micrometer dial gauge or other suitable means.

7.5.1 Test specimens preferably circular ones cut from several random positions of the sheets in the sample, shall have an area of  $40 \text{ mm}^2 \pm 5$  percent. Where material sample is less than 6 mm thick two or more specimens may be superimposed to give a thickness of approximately 6 mm.

7.5.2 The test specimen conditioned as outlined in 7.1 shall be placed between the platen and its initial thickness  $t_1$ , measured when the preload is 7 kPa\*. The load shall then be increased at a uniform rate until the pressure of 2 800 kPa is reached within  $30 \pm 10$  seconds after which the load shall be maintained for a further  $30 \pm 5$  seconds. The thickness  $t_2$  of the test pieces shall be determined. The major load shall then be reduced to preload ( 7 kPa ) position and after  $60 \pm 5$  seconds the thickness  $t_3$  of the test pieces under test shall be measured. The compressibility and recovery shall be calculated as under:

$$\text{Compressibility, percent} = \frac{t_1 - t_2}{t_1} \times 100$$

$$\text{Recovery, percent} = \frac{t_3 - t_2}{t_1 - t_2} \times 100$$

The values of the compressibility and recovery shall not be less than those specified in Table 1 for that grade.

7.6 *Compression Set* — The method of test shall be as described in IS : 3400 ( Part X ) - 1969 'Methods of test for vulcanized rubbers: Part X Compression set at constant strain', the temperature of test being  $110^\circ\text{C}$  and the recovery time 1 hour.

7.6.1 Where material is less than 5 mm thick, the test specimen should be built up to not less than 6 mm thickness nor more than 12 mm.

7.6.2 At the end of the compression period the test specimens shall be removed and allowed to rest at room temperature and humidity for an hour before measuring thickness. The values of the compression set shall be as specified in Table 1.

7.7 *Flexibility* — Three test specimens (where possible 25 mm wide and of suitable length) shall be cut from each sheet in the sample from widely separated positions.

7.7.1 The test specimens shall be bent through  $180^\circ$  round a mandrel of diameter 3 times the thickness of the specimen for materials up to 3 mm thickness, or 4 times the thickness of the specimen for

\*1 kgf/cm<sup>2</sup> = 98.0665 kPa.

stability, resistance to liquids and chemical ~~tests on water extract~~. The lot shall be declared conforming to the above requirements if all the cork ~~composition~~ sheets satisfy the relevant requirements.

**A-2.4** The lot shall be declared conforming to the requirements of this standard if it is found satisfactory according to **A-2.1**, **A-2.2** and **A-2.3**.

#### **EXPLANATORY NOTE**

This standard was originally issued in 1968. Based on the experience gained by the use of this standard, the committee decided to revise this standard. In this revision:

- a) different abbreviations for the use of particular type and grade of material have been incorporated for the benefit of the consumer; and
- b) revised fluid resistance test has been included.

The materials covered by this standard are, in general, stronger and more resilient than the cork composition sheets specified in Part I of this standard and in some cases possess a high resistance to oil and petrol. They are also more resistance to dimensional changes under varying climatic conditions of storage, but it is recommended that gaskets cut from these sheets should not be stored under conditions of high temperature and high humidity or stress, or for periods which are likely to cause deterioration.



materials over 3 mm thick, the flexing being carried out at a reasonably steady rate at a temperature between 18°C and 24°C. The requirement that there shall be no breakage shall imply no breakage through the granules of cork or separation of the granules. If any of the test specimens fails then a complete retest with another set of specimens shall be carried out and the material shall be deemed to comply only if all these test specimens show no breakage.

**7.8 Fluid Resistance Test** — Samples preferably of more than 25 mm<sup>2</sup> area shall be completely immersed by some suitable means in:

- a) water for 3 hours at 100°C, and
- b) 35 percent hydrochloric acid for 30 minutes.

On removal from fluids, the samples show no disintegration or deterioration in case of water and a slight deterioration in case of 35 percent hydrochloric acid.

For Type B and C immersion test in ASTM oil No. 3 for 70 hours at 100°C requirements:

- a) For Type B, change in volume — 25 percent
- b) For Type C, change in volume — 15 percent.

**7.9 Chemical Tests on Water Extract** — When specified by the purchaser, chemical tests on water extract shall be performed to determine if the material is free from corrosive impurities.

**7.9.1** Draw 15 g of the material from each sheet in the sample in the form of cut pieces not larger than 3 mm cube and place them in a chemically resistant glass flask with 300 ml of distilled water. Boil for 1 hour under a water-cooled reflux condenser having a ground-glass connection with the flask, after which the flask shall be immediately stopped and cooled to room temperature. Decant a portion of the water extract for determination of pH value. The electrometric method, with glass electrode, shall be used for this purpose. Filter the remainder of the water extract and use 100 ml of this for the determination of chlorides in accordance with 9 of IS : 4202-1967 'Method for determination of chloride content of textile materials' and another 100 ml for the determination of sulphates in accordance with 9 of IS : 4203-1967 'Method for determination of sulphate content in textile materials'. The pH value, and the values of the chlorides and sulphate contents shall be as given in Table 1.

**Note 1** — For chlorides use the formula given in 9.2.3 (a) of IS : 4202-1967.

**Note 2** — For sulphates use the formula given in 9.2.3 (a) of IS : 4203-1967.

**8. Fungus-Proofing** — When required by the purchaser, the gasket shall be treated to provide complete protection against microbiological attack by complete immersion in a suitable fungicide (such as a solution of *p*-nitrophenol or pentachlorophenol) for not less than 2 minutes followed by draining and drying.

**9. Marking** — Cork composition sheets shall be marked with:

- a) manufacturer's name or trade-mark (if any),
- b) date of manufacture, and
- c) the grade.

The marking of the grades shall be such that it may be readily identified on a piece 300 × 300 mm cut from any position of the sheet.

**9.1 Certification Marking** — Details available with the Bureau of Indian Standards.

**10. Packing** — Cork composition sheets shall be suitably packed to prevent damage.

**11. Storage** — Gasket shall not be stored under conditions of temperature, humidity or stress, or for reasonable period of time, which are likely to cause deterioration.

AMENDMENT NO. 1 SEPTEMBER 1987

TO

IS:4253(Part 2)-1980 SPECIFICATION FOR CORK  
COMPOSITION SHEETS

PART 2 CORK AND RUBBER

(First Revision)

(Page 3, clause 7.5.1, line 2) - Substitute  
'400 mm<sup>2</sup>' for '40 mm<sup>2</sup>'.

(EDC 58)

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Reprography Unit, BIS, New Delhi, India



**AMENDMENT NO. 2 AUGUST 1988**  
**TO**  
**IS : 4253 ( Part 2 ) - 1980 SPECIFICATION FOR**  
**CORK COMPOSITION SHEETS**

**PART 2 CORK AND RUBBER**

*( First Revision )*

*( Page 1, clause 3 )* — Substitute the following for the existing clause :  
**'3. Thickness** — Standard preferred thicknesses are 1·0, 1·2, 1·5, 1·8, 2·0, 2·5, 3·0, 3·5, 4·0, 4·5, 5·0, 5·5, 6·0, 7·0, 8·0, 9·0, 10·0, 11·0, 12·0, 13·5 and 15·0 mm.

Any other thickness may be used as agreed between the purchaser and the manufacturer.'

*[ Page 2, Table 1, Sl. No. (i) ]* — Substitute ' $\pm 5$ ' for ' $\pm 10$ ' for hardness in all the columns.

*[ Page 2, Table 1, Sl. No. (v) ]* — Substitute '75 percent' for '80 percent' for Recovery, percent for types RC 80—A, RC 80—B and RC 80—C.

**( EDC 58 )**

**AMENDMENT NO. 3 NOVEMBER 1993  
TO  
IS 4253 ( Part 2 ) : 1980 SPECIFICATION FOR CORK  
COMPOSITION SHEETS**

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**PART 2 CORK AND RUBBER**

*( First Revision )*

*( Page 3, clause 7.5.1 )* — Add the following sentence at the end:

**'For cork sheets having thickness greater than 6 mm, test piece shall be reduced to 6 mm by means of a suitable method.'**

**( LM 19 )**

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**Reprography Unit, BIS, New Delhi, India**



TABLE 1 PROPERTIES OF CORK COMPOSITION SHEETS

(Clauses 4, 5, 7.4, 7.5.2, 7.6.2 and 7.9.1)

| SI No.                                           | Property                                  | Type A<br>( Non-Oil Resistant ) |                                                                                           |        | Type B<br>( Good Oil Resistant )                                                                                                                                             |        |                                                                                                                                                                                                                                                                                                                                                              | Type C<br>( Very Good Oil Resistant ) |        |        | Method of Test                                            |
|--------------------------------------------------|-------------------------------------------|---------------------------------|-------------------------------------------------------------------------------------------|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|--------|--------|-----------------------------------------------------------|
|                                                  |                                           | RC50—A                          | RC70—A                                                                                    | RC80—A | RC50—B                                                                                                                                                                       | RC70—B | RC80—B                                                                                                                                                                                                                                                                                                                                                       | RC50—C                                | RC70—C | RC80—C |                                                           |
| i)                                               | Hardness, IRHD                            | 50±10                           | 70±10                                                                                     | 80±10  | 50±10                                                                                                                                                                        | 70±10  | 80±10                                                                                                                                                                                                                                                                                                                                                        | 50±10                                 | 70±10  | 80±10  | IS : 3400<br>( Part II ) -<br>1965*<br>See 7.3<br>See 7.4 |
| ii)                                              | Dimensional changes, percent, <i>Max</i>  | 1.5                             | 1.5                                                                                       | 1.5    | 1.5                                                                                                                                                                          | 1.5    | 1.5                                                                                                                                                                                                                                                                                                                                                          | 1.5                                   | 1.5    | 1.5    |                                                           |
| iii)                                             | Tensile strength, kPa† <i>Min</i>         | 650                             | 900                                                                                       | 1 250  | 700                                                                                                                                                                          | 1 250  | 1 550                                                                                                                                                                                                                                                                                                                                                        | 1 250                                 | 1 550  | 1 900  |                                                           |
| iv)                                              | Compressibility ( at 2 800 kPa ), percent | 45—65                           | 30—45                                                                                     | 15—30  | 45—60                                                                                                                                                                        | 35—50  | 25—35                                                                                                                                                                                                                                                                                                                                                        | 35—45                                 | 25—35  | 15—25  | See 7.5                                                   |
| v)                                               | Recovery, percent, <i>Min</i>             | 80                              | 80                                                                                        | 80     | 80                                                                                                                                                                           | 80     | 80                                                                                                                                                                                                                                                                                                                                                           | 80                                    | 80     | 80     | See 7.5                                                   |
| vi)                                              | Compression set, percent, <i>Max</i>      | 90                              | 90                                                                                        | 90     | 80                                                                                                                                                                           | 85     | 90                                                                                                                                                                                                                                                                                                                                                           | 80                                    | 85     | 90     | See 7.6                                                   |
| vii)                                             | Chemical test on water extract :          |                                 |                                                                                           |        |                                                                                                                                                                              |        |                                                                                                                                                                                                                                                                                                                                                              |                                       |        |        | See                                                       |
|                                                  | a) pH, where applicable                   | 5.0 to 8.5                      |                                                                                           |        | 5.0 to 8.5                                                                                                                                                                   |        |                                                                                                                                                                                                                                                                                                                                                              | 5.0 to 8.5                            |        |        |                                                           |
|                                                  | b) Chloride content (as chloride ion)     | 0.2 percent <i>Max</i>          |                                                                                           |        | 0.2 percent <i>Max</i>                                                                                                                                                       |        |                                                                                                                                                                                                                                                                                                                                                              | 0.2 percent <i>Max</i>                |        |        |                                                           |
|                                                  | c) Sulphaté content (as sulphate ion)     | 0.2 percent <i>Max</i>          |                                                                                           |        | 0.2 percent <i>Max</i>                                                                                                                                                       |        |                                                                                                                                                                                                                                                                                                                                                              | 0.2 percent <i>Max</i>                |        |        |                                                           |
| Gaskets suitable for<br>( abbreviation symbols ) |                                           | GP                              | <br>GP |        | <br> |        | <br><br><br> |                                       |        |        |                                                           |

\*Methods of test for vulcanized rubbers: Part II Hardness.

†1 kgf/cm<sup>2</sup> = 98.066 5 kPa= Light electrical and general  
automotive industries

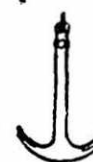
= Automobile industry



= Heavy electrical industry



= Aircraft industry

= Ship building and  
maintenance

GP = General purpose only