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मानक
Indian Standard

लेपित अपघर्षक — विशिष्टि

Coated Abrasives — Specification

भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुर शाह ज़फर मार्ग, नई दिल्ली - 110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI - 110002
www.bis.gov.in www.standardsbis.in

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FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft was finalized by the Abrasives Sectional Committee and approved by the Production and General Engineering Division Council.

Coated abrasives are essential consumables used in material removal, surface preparation, and polishing across training, production, and high‑precision manufacturing. The raw materials, constructions, and performance requirements for coated abrasives have evolved significantly since the original IS 2817:1965 specification.This revision brings the standard into conformity with modern materials science, design principles, international test methods, and the needs of today’s industries.

IS 2817:1965 — Methods for Sampling of Coated Abrasives (first revision)

For the purpose of determining compliance, numerical results shall be rounded off in accordance with IS 2:2022 'Rules for rounding off numerical values (second revision)'. The number of significant places retained in the rounded‑off value shall be the same as that of the specified value.

Indian Standard

COATED ABRASIVES — SPECIFICATION

1 SCOPE

This Standard prescribes requirements for coated abrasives(belts, discs, and sheets)—flexible products with abrasive grains bonded to backings—intended for material removal, surface finishing, and polishing .

2 TERMINOLOGY

2.1 Abrasive grains: Hard particles (aluminum oxide, silicon carbide, ceramic) that cut or wear material by friction.

2.2 Backing: Flexible support (paper, cloth, film) onto which abrasive grains are bonded.

2.3 Bond: Adhesive (resin , glue) that holds abrasive grains onto the backing.

2.4 Coating: Optional layer (stearate) applied over the abrasive .

2.5 Grit size: Particle size designation indicating average grain diameter. According to (p12 -p5000 , FEPA "P") .

2.6 Lot: Group of coated abrasive items of the same type, backing, bond, and grit size packaged together.

2.7 Item: Single unit of coated abrasive .
2.8 Sample: Randomly selected items from a lot for inspection or testing.

2.9 Defect: Any deviation from specified requirements, classified as Critical, Major, or Minor .

2.10 Acceptance Quality Limit (AQL): Maximum allowable percentage of defective items in a lot, used to determine sampling plans as per ISO 2859‑1.

3 CLASSIFICATION

3.1 Coated abrasives are classified primarily by their nominal grit size and intended application, These are classified as ,

a) Coarse —For heavy stock removal, weld cleaning, typically on durable backings for aggressive material removal.
b) Medium — For general-purpose sanding and smoothing on metal, wood, and composites, balancing cut rate and surface finish.

c) Fine — For surface preparation before painting or finishing, removing minor imperfections and smoothing substrates.
d) Ultra-fine — For final polishing and high-gloss finishes on metals, plastics, and composites, providing ultra-smooth surfaces.

4 REQUIREMENTS

4.1 Abrasive Grains

a) Types**:** Aluminum oxide, silicon carbide, ceramic alumina, diamond.
b) Grain Shape: Sharp-irregular (alumina/silicon carbide) or blocky (ceramic) for controlled cutting.
c) Quality: Must meet size-distribution tolerances and friability requirements as per ISO 6344-1.

4.2 Backing Material

a) Paper: Weight grades Ato Fb , thickness 0.08–0.25 mm , tensile strength greater than 200 N/15 mm.
b) Cloth: Grades J, X, Y , tensile strength greater than 500 N/15 mm , elongation less than 10 %.
c) Nonwoven: Fibre density 80 to 200 g/m² , tear resistance greater than 50 N.
d) Film: Polyester or PVC film thickness 0.05 to 0.15 mm; tear resistance greater than 100 N.

4.3 Bonding Agents

a) Resin Bonds: shall Use Phenolic or urea–formaldehyde, heat-cured at 150 to 180 °C.
b) Latex or Acrylic: Room-temperature cure , flexible for wet or dry use.
c) Bond Content: shall be 10–20 % by weight of coated product.

4.4 Coating and Stearate

a) Stearate Layer: Shall Use Zinc or calcium stearate, 1 to 3 % by weight; anti-loading.
b) Topcoat: may be applied polymer over-layer for moisture protection.

5 MANUFACTURING AND WORKMANSHIP

5.1 Construction Methods

a) Hand-coating and finishing
b) Machine-based roll-coating and slitting
c) Hybrid: Machine coating with manual edge trimming or inspection

5.1.1 The coated abrasive shall be constructed using precision-coated abrasive grain over a flexible backing (paper, cloth, film, or nonwoven), bonded with resin or adhesive in one or more layers. The product shall undergo:

a) Even application of abrasive grain across the backing surface
b) Controlled drying/curing of resin bonds at standard operating temperatures (typically 150–180 °C)
c) Optional application of topcoats or stearate layers to enhance performance
d) Slitting, cutting, or die-punching into specified dimensions with trimmed or reinforced edges (in case of belts/discs)

5.2 Process Monitoring
The manufacturer shall maintain statistical process control (SPC) with minimum process capability index values (Cp, Cpk) greater than 1.33 for key parameters such as grain spread, bond thickness, and backing alignment

6 SAMPLING, INSPECTION, AND TESTING

6.1 **Sampling Plans and Defect Criteria**

6.1.1) "Sampling procedures for inspection by attributes — Defect classifications."

Defect classification and corresponding AQLs:

i) Critical defects: AQL 0 %

ii) Major defects: AQL 1 %

iii) Minor defects: AQL 4 %

6.2 **Sample Selection Sample Selection**

6.2.1)Random selection of packages and items; use random-number tables or generators.

6.2.2)Discard first few units if damaged, then select every r^{th} item where r = lot size/sample size.

Table A. Sampling Plans for Visual and Dimensional Inspection

Lot Size	Sample Size	Allowable Major Defects (AQL 1.0%)
Up to 150	8	0
151–500	13	1

501–3000	20	2
Above 3000	32	3

Sampling standards referenced: ISO 2859‑1:2013; ASTM E2234.

6.3 **Inspection and Testing Methods Inspection and Testing Methods**
Each sample item shall undergo the following tests, performed under specified conditions and acceptance values:

6.3.1 *Tensile Strength Test*

a) Specimen Preparation : From each test item, cut a total of six rectangular strips, each measuring 25 mm wide and 200 mm long. Three strips shall be taken along the machine direction, and three across cross direction. Ensure edges are clean-cut and free from nicks.

b) Test Method : Use a calibrated universal tensile testing machine set at a constant crosshead speed of 50 mm/min. The strip is clamped between jaws set 100 mm apart. Apply tension until the strip breaks. Record the peak force in Newtons for each strip.

c) Acceptance Criteria : For paper-backed products: each strip must withstand a tensile force of at least 200 N per 15 mm width.
For cloth-backed products: each strip must withstand at least 500 N per 15 mm width.

6.3.2 Abrasion Resistance Test

a)Specimen Preparation : Cut a circular sample of the coated abrasive (50 mm diameter) and securely mount it on the specimen holder of a Taber Abraser.

b)Test Method : Conduct the test using two H‑18 abrasive wheels under a 500 g load per wheel. The wheels shall rotate against the surface of the abrasive for 1,000 revolutions as per ISO 5470‑1 . The sample shall be reconditioned and cleaned after testing to remove loose particles.

c)Acceptance Criteria : The specimen must: Show no breakthrough or wear-through of the backing material. Have a weight loss les than 15 mg after 1,000 cycles, indicating high abrasion resistance.

6.3.3 Grain-Size Distribution Test

a)Specimen Preparation : Using a scraping or brushing tool, carefully remove and collect a minimum of 10 g of abrasive grains from the surface of the coated product, ensuring no contamination from the backing or adhesive.

b)Test Method : For grit sizes P12–P240, conduct a wet sieving procedure using calibrated sieves to separate grain sizes based on particle diameter. For finer grits (P280–P5000), use sedimentation methods in a water column to measure grain settling rates and classify distribution. as per ISO 6344-2

c) Acceptance Criteria : At least 50% by mass of the collected grains must fall within one grit grade above or below the nominal grit size printed on the product (for example P120, grains should fall between P100 to P150).

6.3.4 Cut-Rate Test

a)Specimen Preparation : Secure a flat metal test panel of size 100 mm × 50 mm beneath the coated abrasive sample in a standard abrasion or polishing apparatus.

b) Test Method : Apply a constant load of 5 N on the abrasive and move it linearly over the panel at a constant speed of 200 mm/s for a total test duration of 60 seconds, as per ASTM C131. Collect the weigh the material removed.

c) Acceptance Criteria : The abrasive must remove at least 0.10 g/cm²·min of material from the test surface.

6.3.5 Friability Test

a)Specimen Preparation: Place 10 g of loose abrasive grains—collected from a fresh or representative sample put into the friabilimeter drum.

b)Test Method : Rotate the drum at 60 rpm for 10 minutes as per ASTM F3040. After testing, sieve and weigh the fractured particles to assess breakage.

c)Acceptance Criteria : At least 60% of the grains must fracture, exposing new cutting edges.

6.3.5 VOC Emissions Test

a) Specimen Preparation : Cut a 100 cm² sample of the coated abrasive and place it inside a VOC emission chamber.

b)Test Method : Measure the concentration of volatile organic compounds (VOCs) emitted over 24 hours at 23 +- 2 °C, asper ISO 16000-9.

c)Acceptance Criteria : The sample must emit less than 5 mg/m³ of VOCs.

8 PACKING

7.2.1 Packing shall protect coated abrasives from damage, moisture, and contamination during storage and transport. Materials and methods include:

a) Inner wrap : Individual sheets, discs, and small belts in moisture-resistant polyethylene film or polybags greater than 100 μm.
b) Support tubes : Rigid cardboard or plastic cores for rolls and long belts.
c) Cushioning : Foam inserts or corrugated paper separators within cartons.
d) Cartoning : Sturdy corrugated boxes with dividers, sealed with water-activated or pressure-sensitive tape.
e) Storage : Store at 10 to 30 °C, less than 65 % RH, off the floor, away from sunlight and heat.

7.2.2 *BIS Certification Marking*

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the product(s) may be marked with the standard mark.

Table 1. Classification Detail and Performance Parameters

Category	**Backing Type**	**Backing Thickness**	**Min Tensile (N/15 mm)**	**Abrasion Cycles (ISO 5470-1)**	**Min Cut-Rate (g/cm²·min)**
Coarse	Cloth, Heavy Paper	0.20–0.25 mm	500	500	0.25
Medium	Paper, Cloth	0.12–0.20 mm	300	800	0.15
Fine	Paper, Film	0.08–0.15 mm	200	1000	0.10
Ultra-fine	Film, Nonwoven	0.05–0.10 mm	150	1500	0.05

Friability and Voc for all tests is 60 % and 5mg/m^3 .

ANNEX A (Normative): Sampling Tables

Lot-wise Sampling Plan for Finished Goods Inspection of Coated Abrasives

Sl. No.	Lot Size (Number of Units)	Sample Size (Number of Units to be Tested)
1	Less than 3	100% Sampling (All units to be tested)
2	3 to 8	2 units
3	9 to 15	3 units
4	16 to 25	5 units
5	26 to 50	8 units
6	51 to 90	13 units
7	91 to 150	20 units
8	151 to 280	32 units
9	281 to 500	50 units
10	501 to 1200	80 units

11	1201 to 3200	125 units
12	3201 to 10000	200 units

ANNEX B:

Joint Failure Test Sampling for Coated Abrasive Belts

B.1 Scope

This annex specifies the sampling plan and test conditions for evaluating the joint strength of coated abrasive belts under cyclic stress.

B.2 Sampling Plan

Coated Abrasive Type	Belt Category	Width "W" (mm)	Length "L" (mm)	Lot Size	Sample Size	Testing M/c	Sample Width (mm)	Sample Length (mm)	Input Pressure (kg/cm²)	Oscillation (Cycles/min)	Acceptance Criteria (Cycles)
Belts	**Narrow Belt**	**20 < W < 455**	**400 < L < 10000**	**≤ 50 joints**	**6 readings**	**JFS Tester**	**13**	**450**	**3.2**	**100**	**> 2000 for L < 4000 mm**
				51–250 joints	**9 readings**						**> 1000 for L ≥ 4000 mm**
				> 250 joints	**9 readings per 250 joints**						**Customized as per application**

Belts	**Wide Belt**	**456 < W < 2850**	**1800 < L < 4500**	**< 5 belts**	**3 readings**	**JFS Tester**	**13**	**450**	**3.2**	**100**	**Same as above**
				5–50 belts	**6 readings**						
				> 50 belts	**9 readings**						

B.3 Test Conditions

– Machine: JFS (Joint Failure Strength) Tester
– Sample dimensions: 13 mm width × 450 mm length
– Input pressure: 3.2 kg/cm²
– Oscillation rate: 100 cycles per minute

B.4 Acceptance Criteria

– For belt length < 4000 mm: ≥ 2000 cycles
– For belt length ≥ 4000 mm: ≥ 1000 cycles
– Special applications may require custom acceptance thresholds