



Designation: D5426 – 08^{ε1}

Standard Practices for Visual Inspection and Grading of Fabrics Used for Inflatable Restraints¹

This standard is issued under the fixed designation D5426; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

^{ε1} NOTE—In Table 4, the definition for “Missing yarn” was corrected editorially from “a yarn discontinuity...” to “more than one yarn discontinuity...” in April 2011.

1. Scope

1.1 These practices cover procedures for the inspection and grading of coated and uncoated woven flat and one-piece woven (OPW) fabrics, and for the inspection and culling of cut parts made of such fabrics, all of which are used in the manufacture of inflatable restraint cushions.

1.2 For ease of reference, the scope, summary of practice, significance and use, apparatus, sampling, procedure, and report sections are listed separately for each inspection practice.

| Inspection Practice | Section |
|---------------------|---------|
| Fabric Rolls | 7 |
| Cut Pieces & OPW | 8 |

1.3 These practices can be used to distinguish those fabric imperfections that may adversely affect inflatable restraint cushion fabrication or performance from those imperfections that will not.

1.4 Procedures and apparatus other than those stated in these practices may be used by agreement of the purchaser and supplier with the specific deviations from these practices acknowledged in the report.

1.5 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.6 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards*:²

D123 *Terminology Relating to Textiles*

D6799 *Terminology Relating to Inflatable Restraints*

2.2 *ASTM Adjuncts*:³

Reference Photographs of Imperfections

3. Terminology

3.1 For all terminology relating to D13.20, Inflatable restraints, refer to Terminology D6799.

3.1.1 The following terms are relevant to this standard: abrasion, air splice, bleedthrough, blip, broken filament, bruise, coating slub, coating streak, coating transfer, contamination, cushion, defect, filling bar, finished, foreign matter, grading, hard contamination, heavy coating streak, hole, imperfection, inflatable restraint, inspection, light coating, light coating streak, long float, loop, major imperfection, minor imperfection, missing coating, missing yarn, misweave, module, rework, sharp crease, short float, short knot, soft contamination, spit mark, stain, stitching, tight yarn, yarn streak.

3.2 For all other terms related to textiles, see Terminology D123.

4. Summary of Practices

4.1 Rolls of finished or coated fabric are examined for imperfections as the fabric traverses an inspection station. They are graded per Tables 1-5 .

4.2 Cut pieces are inspected individually for imperfections. Cut pieces containing imperfections are culled from use for later review.

¹ These practices are under the jurisdiction of ASTM Committee D13 on Textiles and are the direct responsibility of Subcommittee D13.20 on Inflatable Restraints. Current edition approved July 1, 2008. Published August 2008. Originally approved in 1993. Last previous edition approved in 2007 as D5426 – 07a. DOI: 10.1520/D5426-08E01.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service ast.service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ Available from: ASTM International Headquarters. Order Adjunct No. ADJD5426. Original adjunct produced in 1996.

TABLE 1 Coating Non-Uniformity

| Imperfection | Definition | Limits | | |
|---|--|---------------------------------|--------------------|--|
| | | Maximum Size ^A | Minimum Separation | Maximum Frequency ^B |
| Soft contamination | the presence of materials not specified as part of the coating or fabric within or on the coating layer, such material visibly appearing to be of small size, smooth in surface texture, and of a thickness that does not protrude significantly above the surface of the coating layer. Examples are dirt, smudge, lint, human hair, yarn filaments, and flies and similarly small insects. Soft contamination not listed herein shall be from a known source which is demonstrated to have no adverse effect on fabric properties. | 15 mm diameter | | 2 none within the line where two OPW inflatable layers interface |
| Hard contamination | the presence of non-coating material within or on the coating layer, such material visibly appearing to be of small size, smooth in surface texture, and of a thickness that protrudes significantly above the surface of the coating layer. Examples are metal filings, glass, plastic, or wood splinters. | none | | none allowed |
| Missing coating | portions of the coated layer containing exposed base fabric or scrape marks in the coated layer | 15 mm diameter or 5mm diameter | | 2 or 5 none within the line where two OPW inflatable layers interface none allowed |
| Coating transfer | the presence of coating material on the uncoated side, covering one or more yarns | | | |
| Bleedthrough | the presence of coating material on the uncoated side, between two yarns without covering either yarn | 35-mm length | 500 mm | 2 |
| Coating slub | an irregularly shaped lump of coating material on the surface of the coated layer resembling a yarn slub | 15 mm diameter | | 2 per 400 cm ² |
| Spit mark | an essentially round spot of coating material on the surface of the coated layer in which the coating spot is visibly at a higher rate of coverage than the surrounding material. | 15 mm diameter or 5 mm diameter | | 2 per 400 cm ² or 5 per 400 cm ² |
| Heavy coating streak | a narrow area of fabric, generally in the shape of a line oriented in the warp direction of the fabric, in which the coating layer is visibly at a higher rate of coverage than the surrounding material. | 5 mm wide | | No limit |
| Light coating crease | a narrow area of light (not missing) and heavy coating associated with localized creasing in the fabric, visibly at a lower rate of coverage than the surrounding material. | 5 mm wide | | 3 none within the line where two OPW inflatable layers interface |
| Light coating streak | a narrow area of light coating (not missing), generally in the shape of a line oriented in the warp direction of the fabric. | 5 mm wide | | 1 |
| Light coating (except light coating streak) | a localized amorphous area of fabric in which the coating layer is visibly at a lower rate than the surrounding material. | 50 × 100 mm | | 1 |

^A For diameter call outs, an equivalent area is permissible

^B Per linear m (yd), or unit of area indicated. For cut pieces ≤ 2 meters in longest dimension. For cut pieces > 2 meters in longest dimension, multiply limits by 1.5. Per linear m (yd), cut piece, or unit of area indicated.

5. Significance and Use

5.1 These practices are suitable for incorporation in a specification. Any reference to material or cushion specification in these practices shall mean any similar agreement between the purchaser and supplier relating to the inspection and acceptance of fabric intended for inflatable restraint use.

5.2 These practices constitute the terminology, conditions, equipment, and procedures by which rolls of inflatable restraint fabrics or cut parts are inspected and graded.

5.3 A specification incorporating these practices may deviate from them to account for considerations of fabric property, material handling equipment, or inflatable restraint cushion design, or a combination thereof. Whenever such deviations from standard occur, they are recorded in the report.

5.4 These practices acknowledge that, in the normal course of production, acceptable rolls of fabric will be produced containing imperfections; subsequently, pieces will be cut from

the rolls and those pieces that contain imperfections restricted in **Tables 1-5** will be culled at that time.

5.5 The accuracy in the results from visually inspecting fabric using these practices is affected by the ability of the inspector to detect, identify, and evaluate the severity of an imperfection in a moving fabric or in a cut part. Such ability can be affected by visual acuity, viewing distance, fabric traverse speed, lighting conditions, inspector discipline and training, and the availability and accuracy of suitable visual aids.

5.6 Systematic bias may result from using these practices whenever the precision or scale of the visual aids used to identify and quantify imperfections differs between the purchaser and supplier.

6. Visual Aids

6.1 A calibrated measuring device or clear template of sufficient size to contain an array of circles whose diameters

TABLE 2 Yarn Non-Uniformity

| Imperfection | Definition | Limits | | |
|-----------------|---|---------------------------|--------------------|--|
| | | Maximum Size ^A | Minimum Separation | Maximum Frequency ^B |
| Foreign matter | an extraneous interwoven fragment whose size, color, or texture indicates that it is not of the same material as the fibers in the base fabric | | | none allowed |
| Loop | a continuous full yarn that curls back on itself and protrudes from the surface of the fabric (synonym: <i>kink, snag</i>) | | | none allowed |
| Air splice | the thicker portion of a yarn resulting from entanglement of the filaments at the ends of two multifilament yarns to create a continuous yarn | | | 2 per 400 cm ² |
| Blips | any short, irregularly shaped or textured portion of an individual multifilament yarn that has been woven into the fabric, including slough offs, stripbacks, fuzz balls, snarls, kinky filling less than a loop, and slubs | 35-mm by 2 -mm length | | 2 none within the line where two OPW inflatable layers interface |
| Short knot tail | a small knob of yarn and associated tails where two yarns are tied together by interlocking loops for the purpose of maintaining yarn continuity | 3-mm diameter | 500 mm | 2 |
| Broken filament | an individual filament, separated from a multifilament yarn bundle, that lies on the surface of the fabric | | | no limit |

^A For diameter call outs, an equivalent area is permissible.

^BPer linear m (yd) or unit of area indicated. For cut pieces, limits apply to cut pieces ≤ 2 meters in longest dimension. For cut pieces > 2 meters in longest dimension, multiply limits by 1.5.

TABLE 3 Discoloration

| Imperfection | Definition | Limits | | |
|--------------|--|---------------------------------------|--------------------|---|
| | | Maximum Size ^A | Minimum Separation | Maximum Frequency ^B |
| Stain | an area of discoloration that penetrates the fabric surface must be from a known source which is demonstrated to have no adverse effect on fabric properties or the presence of marking ink in an area of fabric not provided for identification by an applicable specification. | 3-mm diameter or 15 mm diameter | | 10 per 400 cm ² or 2 per 400 cm ² |
| Yarn streak | discoloration or stain of an individual yarn that does not affect adjacent yarns | 1000-mm length cumulative | | 1 |

^A For diameter call outs, an equivalent area is permissible.

^BPer linear m (yd) or unit of area indicated. For cut pieces, limits apply to cut pieces ≤ 2 meters in longest dimension. For cut pieces > 2 meters in longest dimension, multiply limits by 1.5.

[ASTM D5426-08e1](https://standards.iteh.ai/catalog/standards/sist/b5-9910-7c586685ae27/astm-d5426-08e1)

TABLE 4 Miscellaneous

| Imperfection | Definition | Limits | | |
|--------------|--|---------------------------|--------------------|--------------------------------|
| | | Maximum Size ^A | Minimum Separation | Maximum Frequency ^B |
| Hole | an opening not characteristic of the normal weave pattern where one or more yarns is cut, torn, or shifted | | | none allowed |
| Missing yarn | more than one yarn discontinuity resulting in a change in weave pattern | | | none allowed |

^A For diameter call outs, an equivalent area is permissible.

^BPer linear m (yd) or unit of area indicated. For cut pieces, limits apply to cut pieces ≤ 2 meters in longest dimension. For cut pieces > 2 meters in longest dimension, multiply limits by 1.5.

equal the length, diameter, separation, or area limits listed in **Tables 1-5**, with labeling corresponding to the terminology for each imperfection: 3, 10, 15, 35, 50, 200, 225, 300, 400 and 500 mm. The template should be positioned such that the maximum number of imperfections is captured.

6.1.1 Dimensions on the measuring device or template shall be traceable to the National Institute for Standards and Technology (NIST) (or similarly recognized standards facility) via a master reference standard to ensure accuracy.

6.2 Reference photographs of each imperfection listed in **Tables 1-5** based on [ADJD5426](#).

7. Practice for Inspecting Fabric Rolls

7.1 *Scope*—This practice describes a procedure for the inspection and grading of coated and uncoated woven fabrics used in the manufacture of inflatable restraint cushions.

7.2 Summary of Practice:

7.2.1 Rolls of fabric are visually inspected for the presence of imperfections and graded at an inspection station. Rolls of fabric are unwound and rewound as the fabric traverses the inspection station, with provision for interruption of the traverse for stationary inspection.