Designation: D5426 – 08

Standard Practices for Visual Inspection and Grading of Fabrics Used for Inflatable Restraints[1]

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.

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 Tables 1-5 .

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

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

[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.

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[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 standrd'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
Coating transfer	the presence of coating material on the uncoated side, covering one or more yarns			none allowed
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, limits apply to 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.

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: *kink*, *snag*)			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.

[B] Per 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.
[B]Per 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 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	a yarn discontinuity resulting in a change in weave pattern			none allowed

[A] For diameter call outs, an equivalent area is permissible.
[B]Per 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 5 Weave Non-Uniformity

Imperfection	Definition	Limits		
		Maximum Size[A]	Minimum Separation	Maximum Frequency[B]
Abrasion	a localized concentration of multiple broken filaments.			none allowed
Fold over	a hard ridge where a layer is overlapped upon itself where if applicable coating integrity is compromised			none allowed
Long float	a warp or filling yarn extending over six or more filling or warp yarns with which it should be interlaced			none allowed
Short float	a warp or filling yarn extending over five or fewer filling or warp yarns with which it should be interlaced			5 per 400 cm^2 none within the line where two OPW inflatable layers interface
Bruise	a shift in the squareness of the weave pattern in an area that has been subjected to impact or pressure	35-mm diameter	500 mm	2
Tight yarn	a yarn with less crimp than surrounding fibers that may create puckering, which may appear to be shinier or to lie straighter in the weave pattern, or a combination thereof	35-mm length	500 mm	2
Misweave	a change in the weave pattern visually indicated by incorrect interlacing or incorrect insertion of a single unbroken yarn or a single missing yarn. (includes *mispick, missing yarn, wrong draw, jerk-in*).)	1000-mm length		1
Filling bar	a temporary change in the filling-wise density of the weave pattern that:(synonym: *stop/start mark*)			
	1. is in compliance with the specified count			no limit
	2. is not in compliance with the specified count			none allowed
Stitching	(OPW only) the presence of an inter-lace between two layers of fabric in an area not provided for interlacing by an applicable specification.			none allowed

[A] For diameter call outs, an equivalent area is permissible.
[B]Per 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.

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