ZOTEFOAMS

Technical Information Sheet TIS 01

SPECIFICATION

ZOTEFOAMS AZOTE® BRAND FOAM PRODUCTS

The information below is the Zotefoams plc general specification for each of the products identified, unless otherwise agreed between Zotefoams and the customer. Normally, the foam attributes and properties would be expected to fall well within the limits given in this document, but occasionally properties may approach these limits.

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LIST OF TABLES

This specification may be amended periodically in line with our policy of continual improvement. For critical applications or significant new projects, we would recommend that customers contact the Zotefoams Sales department before ordering.

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1. GENERAL INFORMATION

The AZOTE® brand products comprise a range of crosslinked, closed cell foams, physically blown using pure nitrogen gas, and sold under the trademarks Plastazote®, Evazote®, Supazote® and Ecozote®

The AZOTE® brand products are manufactured and sold as, essentially rectangular, sheets (sometimes known as buns or blocks) in a range of sizes, all having process skin surfaces. Talc residues or other processing aids may be present on the skin surfaces.

All information within this specification refers to the products in the form of sheets with process skins unless otherwise stated.

2. PRODUCT DESCRIPTIVE CODES

Each AZOTE® brand foam product is identified by an individual grade descriptive code based on a system that distinguishes the polymer, nominal density, variant type (if applicable) and colour in that order.

a) ***Polymer Code:***
First two letters

Plastazote® or Ecozote® Foam	Evazote® or Supazote® Foam
Polyethylene	Polyethylene Copolymers
LA, LD, MP, HD, PK	EM, EV, VA

b) ***Recycled content code:***
Grades containing recycled material are identified by the letter ‘R’ in the product name after the polymer code, e.g. LDR18BK

c) ***Density Code:***
Two or three digits describing the nominal Skin/Skin density (in kg/m³)

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d) ***Variant Code:***

Where special properties have been imparted to foam, a variant code is used to identify these:

Electrically Conductive	Static Dissipative	Flame Retardant
CN	SD	FR, FM

e) ***Cell Size Code:***

Where grades are made available in more than one cell size range [see Table 1 for product cell size ranges], then an additional description code is used to identify the cell size of the product:

e.g. VA35 - Base product coding (no code suggests standard cell size)
VA35 FC - fine cell variant

Cell size codes:
Large Cell - LC
Intermediate Cell - IC
Medium Cell - MC
Standard Cell - SC
Fine Cell - FC
Superfine Cell - SF

Cell size has no implication for density. In the example above the density of both VA35 and VA35 FC products should be equivalent (accepting normal density distribution) and only the cell dimensions will have changed.

It is important to recognise that as foam density increases then product cell size, as a rule, will increase. This is more clearly shown in Table 1.

f) ***Crosslinking Code:***

Some special grades are produced at greater or lesser crosslink levels than standard. Where the degree of crosslinking is considered standard, then no reference will be made in the grade code. The additional coding descriptions for crosslinking variants are designated as follows:

SV - more lightly crosslinked product
SM
No code - standard level
TM
TV - more highly crosslinked product

g) ***Colour Code:***
Full colour name in English.

As an example of all the above:
Plastazote® LD45 FR Charcoal - AZOTE® branded LDPE foam with a nominal foam density of 45 kg/m³, flame-retardant and charcoal in colour.

3. PRODUCT TYPES

a) ***Sheets, rolls, and laminated sheets:***
Sheets, rolls, and laminated sheets are classified as:

Skin/Skin (S/S)	Skin/Cell (S/C)	Cell/Cell (C/C)
Product retains both process skin surfaces.	Product has one process skin removed.	Product has both process skins removed.

Note: *Any product may have had one or more edge skins removed.*

b) ***Untrimmed & Trimmed***
Fabricated products may then be further subdivided into:

- ***Untrimmed*** - Produced from full size sheets but supplied with untrimmed edges. The tolerances for useable size should be discussed with sales prior to order

Note: *Due to sheet alignment some loss on overall size will occur.*

- ***Trimmed:*** Fabrications have edges trimmed to size and will be useable over the whole size supplied. For tolerances please contact sales prior to order.

Note: *When ordering fabricated sheets and rolls it is necessary to specify the finish required using a combination of the above, e.g. untrimmed c/c, trimmed s/s, etc.*

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4. PRODUCT SIZE

a) ***Sheets***

[Test method: BS EN ISO 1923:1995]

Sheet sizes are defined by length, width, and thickness. Nominal dimensions are the dimensions specified on the acknowledgement of order. For skin/skin sheets, nominal dimensions are the minimum dimensions and will always be met or exceeded. Note: process skins are considered an integral part of the sheet. For fabricated items, such as cell/cell sheets please refer to TIS01 – Annex A or contact our sales team.

A characteristic of AZOTE® and other closed cell foams is the fact that they will reversibly change dimensions with varying temperatures and pressures (climatic conditions). The nominal dimensions acknowledged on the order will be met or exceeded when sheets are equilibrated at standard conditions. (23°C +/- 2°C, standard pressure at sea level).

The yield of a sheet is defined as the cell/cell thickness that can be achieved after removal of the production skins. This yield is calculated as the nominal thickness of the skin/skin sheet minus three millimeters (-3mm). For example, a 2000 mm x 1000 mm x 27 mm specification cell/cell sheet shall be obtainable from nominal 2000 mm x 1000 mm x 30 mm skin/skin sheet.

b) ***Fabricated Items***

Thickness tolerances for split (skived) sheets can be found in TIS01 - Annex A and for laminated blocks in TIS01 – Annex B. For all other tolerances please contact our sales team to enquire.

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5. PRODUCT CHARACTERISTICS

a) ***Quality Control***

Zotefoams quality control procedures cover testing of a random sample from every batch manufactured for the following properties:

- ***Density Skin/Skin*** *[Test method: BS EN ISO 7214:2012]*

Foam densities are measured with process skins intact unless otherwise stated. The density range applies irrespective of foam sheet size or colour.

- ***Cell Size*** *[Test method: Zotefoams Internal]*

Cell size is determined by measuring the diameter of ten representative cells of a sample and reporting the average value.

- ***Voids*** *[Test Method: Zotefoams Internal]*

The method takes into account the perceived seriousness of the void in so much as small voids (≥1 - ≤ 2 mm diameter) are assessed by physical count of an area of a square metre, medium sized voids (>2 - ≤ 4 mm diameter) are counted and then the sum of the cube of all the diameters is quoted per square metre (i.e. one 3 mm diameter void in 1 m^2 = 27). Large voids (>4 - ≤ 5 mm & >5 mm in diameter) are physically counted over an extended area of 15m^2.

Larger cells or pinhole patterns of voids with a diameter below 1mm do not count towards the small voids category. While these may impact the visual appearance of fine cell materials, they do not affect the overall mechanical performance of the foam. Due to the variability of recycled content, Ecozote PE/R foams are more likely to present with the smaller voids.

Void checks are conducted on representative samples for a batch. 100% inspection is not feasible due to the destructive nature of the test.

Void levels are summarised in categories. The category description and the void levels these represent are given in Table 2. Specifications for these properties for our standard products can be found in Table 1

b) ***General Information***

Typical values for other product characteristics such as compression and tensile properties are published on our Product Information documents with corresponding test methods utilised to measure them. These typical values represent the average values of test results carried out on random batches samples from our process.

Where appropriate special properties such as flammability or electrical conductivity will also be provided on our Product Information documents.

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These documents are intended to enable comparison of the performance of our products to judge the most suitable grade and range when selecting a foam for an application.

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c) ***Specification Agreements***

Mechanical properties for foam are not solely defined by the density and polymer used, therefore our Product Information documents quote typical values not a specification. For technical applications where customers have specific requirements and require mechanical properties to meet a specification Zotefoams will negotiate a customer agreement with limits. These limits are set to ensure the customer needs are achieved within the product design stage and within the manufacturing process.

d) ***Test Reports***

Zotefoams provides a statement of compliance that material has been manufactured in line with the specification laid out in this document on every delivery note. Where customers require batch release testing to their specific requirements provision of a Manufacturers Test Report can be included in a customer agreement.

6. PRODUCT APPEARANCE

- ***Voids*** *[Test Method: Zotefoams Internal]*

Void measurements are performed as described in section 5 a) above and void categories are given in Table 1.

Sheet to sheet variability within a batch is expected to be greater for Ecozote® products compared to Plastazote®, with thicker sheets (>50mm nominal) more likely to present higher void levels.

- ***Cell Size*** *[Test method: Zotefoams Internal]*

Cell size ranges by product are given in Table 1.

- ***Colour*** *[Test method: Zotefoams Internal]*

The colour shall be essentially visually uniform within the foam structure of a sheet. However, variation may be found between production Lots and/or individual sheets.

The colour appearance of product will be affected by cell size; for the same colour product, larger cell size appears darker, smaller cell size appears lighter. Perceived colour will therefore be affected by the cell size ranges in Table 1.

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- ***Surface Condition*** *[Test method: Zotefoams Internal]*

The products as manufactured will normally show an embossed pattern on one process skin surface. All process skins may occasionally have slight surface marks, indentations or discolouration. Any surface faults or defects visible on the process skins are not considered to affect the quality of the sheet as long as the specified yield for the product can be obtained. Talc residues, water, other processing aids or paint marks used by Zotefoams plc during manufacture may be present on the skin surfaces and/or edges. No guarantee is offered in relation to the skin surface.

- ***Internal Condition*** *[Test method: Zotefoams Internal]*

The products as manufactured may show internal patterns and markings within the cellular structure. Such appearance faults may be very subtle and would not normally affect foam performance.

- ***Sheet Flatness (Cell/ Cell)*** *[Test method: Zotefoams Internal]*

When sheets are split some waviness may occur at the edges of the sheet. The amplitude and frequency are dependent on the thickness of the split sheet, the original sheet thickness, the product density and the process history of the sheet. Typically, a 6 mm thick split from a 30 mm flat sheet would be expected to have 1.5 to 2.5 waves along its length. These would be more frequent with a 50mm thick sheet and less frequent with 15 mm splits or for trimmed sheets. This waviness would not normally affect the sheet performance and may be further alleviated by trimming of the product prior to splitting through the thickness – note that minimum size specifications detailed earlier (sections 4, 5 & 6) will apply.

- ***Distortion / Bowing (skin/ skin)*** *[Test method: Zotefoams Internal]*

Distortion is the maximum curvature of a sheet and is the measured difference between the apparent thickness over the curvature and the actual thickness of the sheet. Distortion is measured using a standard measuring table and for all skin/skin sheets shall be no more than 20 mm. For HD grades the maximum distortion shall be no more than 30 mm.

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Table 1 - Specifications for Density; Cell Size; & Void Category for each AZOTE Product

Product Reference		Sheet Density[1] (kg/m³)		Cell size (mm)		Void Category (See Table 2)
Grade	Variant	Min	Max	Min	Max	A – K
EM26		20	27	0.2	0.4	C
EV30		28	38	0.3	0.7	C
EV45	CN	37	49	0.2	0.6	E
EV50		41	54	0.25	0.6	C
HD30		23	33	0.25	0.7	K
HD60		43	63	0.4	0.85	K
HD80		58	87	0.4	0.85	K
HD110		85	130	0.7	1.6	K
HD115		90	125	0.7	1.6	K
LA15		14	18	0.1	0.7	C
LD15		14	18	0.2	0.6	C
LD15	FM	14	19	0.2	0.6	C
LD18		18	24	0.5	1.0	C
LDR18		18	24	0.5	1.0	R
LD24		19	25	0.15	0.45	C
LD24	FM	19	26	0.15	0.45	C
LD24	FR	21	28	0.15	0.45	C
LDR27		18	26	0.4	0.9	R
LD29*		25	33	0.4	0.9	C
LDR29		25	35	0.4	0.8	R
LD30	SD	25	35	0.2	0.6	F
LD32	CN	27	37	0.6	1.3	F
LD33		27	35	0.25	0.55	C
LD45		37	47	0.25	0.6	C
LDR45		34	47	0.25	0.6	R
LD45	FR	39	49	0.25	0.6	F
LD50	CN	43	58	0.6	1.1	E
LD60		51	66	0.35	0.9	C
LD70		60	76	0.35	0.9	B
MP15		14	18	0.1	0.3	B
MP15	FR	13	18	0.01	1.2	F
MP15	EB40	13	18	0.01	1.2	F
MP24		17	29	0.1	0.3	B
MP33		28	40	0.15	0.5	B
MP45		38	49	0.15	0.5	B
MT35		31	51	0.01	0.25	A
PE/R24		19	24	0.15	0.45	R
PE/R30		22	32	0.2	0.4	R
PK80		70	91	0.4	0.8	H
VA35		29	39	0.3	0.7	C

* LD29ABK is a separate grade. Please inquire.

[1] Cell/cell densities are lower than the densities quoted. The difference will vary depending on grade and sheet thickness.

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Table 2 - Maximum Void Levels by Category

	≥1 - ≤ 2 mm [No./m²]	>2 - ≤ 4 mm [Σ(D)³/m²][2]	>4 mm[3,4] [No./15m²]
Category A	16	80	1
Category B	50	80	1
Category C	80	80	1
Category D	170	80	1
Category E	120	80	1
Category F	50	200	1
Category G	80	200	1
Category H	80	200	3
Category J	500	200	1
Category K	300	120	3
Category R	200	200	6

D = *Void diameter in mm on any split surface.*

7. FABRICATED PRODUCTS

Fabricated items will be delivered in line with the dimensions and tolerances agreed prior to order. For information on general thickness tolerances for split (skived) sheets and how this is assessed in our process please see TIS01 – Annex A.
Tolerances for laminated blocks are provided in TIS01 – Annex B

[2] Sum of the cube of the void diameters (in mm) per unit area of foam.
[3] Voids greater than 5 mm are not expected to be found except in categories H,K and R (see note (4) below). Any sheets in other categories found containing such voids are rejected.
[4] Holes >5 mm are allowed provided they do not affect service performance and are included in the >4 mm count. Single sheets cannot be checked against this standard.

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Zotefoams plc Management systems are covered by the following:

AEO UK Authorised Economic Operator

Quality
FM 01870
ISO 9001

Safety
OHS 52538
OHSAS 18001 2007

Environment
EMS 36270
ISO 14001 2015

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