ZOTEFOAMS

# Technical Information Sheet TIS 01N

## SPECIFICATION

### ZOTEFOAMS ZOTEK® N 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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**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 ZOTEK® N brand products comprise a range of crosslinked, closed cell foams, physically blown using pure nitrogen gas and based on the polyamide polymers. All grades are thermoformable, though the degree of detail and complexity of moulding possible will vary between grades.

The ZOTEK® N 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

All ZOTEK® N foam products are identified by a descriptive code based on a system that distinguishes the polymer category, nominal density, variant type (if applicable) and colour in that order.

***Polymer Code:*** All Polyamide foam products are identified by the descriptive code "**N**". Within the range other Polyamide polymers are identified by an additional letter referencing the base polyamide polymer used.

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

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

**As an example of all the above:**

***ZOTEK® N B50 Black –*** *ZOTEK branded polyamide foam with a nominal foam density of 50 kg/m³, in black*

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### 3. PRODUCT TYPES

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.*

Fabricated products may then be further subdivided into:

- ***Untrimmed*** - Produced from full size sheets but supplied with untrimmed edges.

***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.

***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.*

### 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 (process skins are considered an integral part of the sheet) are the minimum dimensions and will always be met or exceeded. For cell/cell and skin/cell tolerances see “Fabricated Items” below.

A characteristic of ZOTEK® N 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.

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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 15$m^2$.

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) ***Moisture Content***

The properties and handling of polyamide foams is moisture dependent. To ensure foams remain at their optimum processability the guidelines handling, and manufacturing provided in a separate document need to be considered.

c) ***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.

These documents are intended to enable comparison of the performance of our

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products to judge the most suitable grade and range when selecting a foam for an application.

d) ***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.

e) ***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]*

Voids can be expected within this material which may affect the visual appearance of the sheet however agreed performance characteristics will be met.

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

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

Cell size ranges by product are given in Table 1.

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

While colour is defined through the controlled addition of pigments during the manufacturing process, it is possible for variations to be present in the foam. These can present as banding or flow patterns. As all densities are formulated with the same pigment addition rate, lower density foams will appear lighter than higher density foams within the same product group.
Furthermore 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. 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 no more than 3 waves along its length. These would be less frequent with a thicker sheet. 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.

- ***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 30 mm.

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*Table 1 - Specifications for Density; Cell Size; & Void Category for each ZOTEK F Product*

| Product Reference | Sheet Density[1] (kg/m³) | | Cell size (mm) | | Void Category (See Table 2) |
|---|---|---|---|---|---|
| Grade | Min | Max | Min | Max | A – K |
| N D35 | 30 | 43 | 0.02 | 0.35 | G |
| N B50 | 41 | 57 | 0.1 | 0.45 | H |
| N B70 | 59 | 79 | 0.1 | 0.8 | H |
| N B100 | 95 | 115 | 0.1 | 0.8 | H |
| N C35 | * | | 0.07 | 0.6 | H |
| N C50 | * | | 0.07 | 0.6 | H |
| N C70 | * | | 0.07 | 0.6 | H |
| N C100 | * | | 0.07 | 0.6 | H |

* For density limits please enquire

*Table 2 - Maximum Void Levels by Category*

| | ≥1 - ≤ 2 mm [No./m²] | >2 - ≤ 4 mm [Σ(D)³/m²][2] | >4 mm³ [No./15m²] |
|---|---|---|---|
| Category G | 80 | 200 | 1 |
| Category H | 80 | 200 | 3 |

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

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[1] Cell/cell densities are lower than the densities quoted. The difference will vary depending on grade and sheet thickness.
[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 and K (see note (d) below). Any sheets in other categories found containing such voids are rejected.

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## TITLE

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**Quality**
FM 01870
ISO 9001

**Safety**
OHS 52538
OHSAS 18001 2007

**Environment**
EMS 36270
ISO 14001 2015

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