

# Solutions for the Railway Industry

# In time to catch the train.

**Railway vehicles must be designed in such a way that they protect crew and passengers on board in the event of a fire, enabling effective evacuation and rescue. The harmonized European standard DIN EN 45545-2 defines the fire safety requirements of components used in the industry.**

The material selection process follows three steps:

- Determination of Product Requirements ("R")
- Determination of Hazard Level ("HL")
- Material Identification

## **Determination of Product Requirements ("R")**

Components are classified according to 26 requirement sets (denoted as R1, R2,...), that consist of one or more test methods and the associated permissible value limits. Test methods include smoke toxicity and density and the limiting oxygen index. As examples, R1 defines requirements for interior surfaces, such as window frames and display screens, whereas R22/23 relates to interior seals, coils and contacts.

## **Determination of Hazard Level ("HL")**

The design and operation category of a railway vehicle determines its respective hazard level HL1, HL2 and HL3. The latter is applied for rolling stock such as doubled decker or sleeper trains that have day-to-day operations in underground sections, where it is more difficult to evacuate than a local train that travels short sections.

## **Material Identification**

The ALBIS portfolio for applications meeting the requirements of the European railway industry contains a comprehensive selection of materials from our partners BASF, COVESTRO, LANXESS, SOLVAY and VAMP TECH. Please refer to the table on the reverse side for full details.

**Note:** The list is not exhaustive – please contact your ALBIS representative to discuss your specific application requirements.

## **ALBIS RAILWAY SOLUTIONS**

### **Advantages at a glance:**

- Faster and cost efficient product development cycle through compliant raw materials
- Lower density for lightweight design and resultant energy efficiency
- Performance consistency for improved yield
- Expert and independent technical advice to ensure optimum material selection

|                               |                |                  |           |           | Hazard Level* / Requirement Set |                         |                         |                              |
|-------------------------------|----------------|------------------|-----------|-----------|---------------------------------|-------------------------|-------------------------|------------------------------|
|                               |                |                  | Injection | Extrusion |                                 |                         |                         | Halogen-Free flame retardant |
| Product                       | Polymer/Filler |                  |           |           | HL1                             | HL2                     | HL3                     |                              |
| Ultramid® A3U40G5             | PA66           | GF25 FR(40)      |           |           | R22/R23/R24/<br>R25/R26         | R22/R23/R24/<br>R25/R26 | R22/R23/R24/<br>R25/R26 | y                            |
| Ultramid® A3U42G6             | PA66/6         | GF30             | x         |           |                                 |                         | R22/R23/R24             | y                            |
| Ultramid® A3X2G5              | PA66           | GF25 FR(52)      | x         |           | R25/R26                         | R25/R26                 | R25/R26                 | y                            |
| Ultramid® A3X2G10             | PA66           | GF50 FR(52)      | x         |           | R25/R26                         | R25/R26                 | R25/R26                 | y                            |
| Ultramid® B3UG4               | PA6            | GF20 FR(30)      | x         |           |                                 | R22/R23/R24             |                         | y                            |
| Ultramid® B3UGM210            | PA6            | (GF+MD)60 FR(61) | x         |           | R22/R23/R24/<br>R25/R26         | R22/R23/R24/R25/<br>R26 | R22/R23/R24/<br>R25/R26 | y                            |
| Ultramid® B3U50G6             | PA6            | GF30 FR          | x         |           |                                 | R22/R23/R24             |                         | y                            |
| Ultramid® C3U                 | PA66/6         | FR(30)           | x         |           | R22/R23/R24/<br>R25/R26         | R22/R23/R24/R25/<br>R26 | R22/R23/R24/<br>R25/R26 | y                            |
| Ultradur® B4441 G5            | PBT            | GF25 FR(40)      | x         | x         | R22/R23/R24/<br>R25/R26         | R23/R24/R25/R26         | R24/R25/R26             | y                            |
| Ultradur® B4450 G5            | PBT            | GF25 FR          | x         |           |                                 | R22/R23/R24             |                         | y                            |
|                               |                |                  |           |           |                                 |                         |                         |                              |
| Bayblend® ET3032 FR           | PC             | I-TD10 FR(40+72) | o         | x         | R22/R23/R24                     | R22/R23/R24             | R22/R23/R24             | n                            |
| Bayblend® FR3030              | PC+ABS         | FR(40)           | o         | x         | R22/R23                         | R22/R23                 | R22/R23                 | y                            |
| Bayblend® FR411 MT            | PC             | I-TD20 FR(40)    | o         | x         | R1/R6                           | R1/R6                   |                         | n                            |
| Makrolon® 9125                | PC             | GF20 FR          | x         | x         | R22/R23/R24                     | R22/R23/R24             | R22/R23/R24             | n                            |
| Makrolon® 9425                | PC             | GF20 FR          | x         | x         | R22/R23/R24                     | R22/R23/R24             | R22/R23/R24             | n                            |
| Makrolon® 6265 X              | PC             | FR               | x         |           | R22/R23/R24                     | R22/R23/R24             | R22/R23/R24             | n                            |
| Makrolon® 6485                | PC             | FR               | x         | x         | R22/R23/R24                     | R22/R23/R24             | R22/R23/R24             | n                            |
| Makrolon® 6555                | PC             | FR               | x         |           | R22/R23/R24                     | R22/R23/R24             | R22/R23/R24             | n                            |
| Makrolon® 6717                | PC             | FR               | o         | x         | R4/R22/R23/R24                  | R4/R22/R23/R24          | R4/R22/R23/R24          | n                            |
| Makrolon® FR6002              | PC             | FR               | x         |           | R22/R23/R24                     | R22/R23/R24             | R22/R23/R24             | n                            |
|                               |                |                  |           |           |                                 |                         |                         |                              |
| Durethan® A30SFN31            | PA66           | FR               | x         |           | R22/R23                         | R22/R23                 | R22/R23                 | y                            |
| Durethan® AKV30FN04           | PA66           | GF30 FR          | x         |           | R22/R23                         | R22/R23                 | R22/R23                 | y                            |
| Durethan® B30SFN30            | PA6            | FR               | x         |           | R22/R23                         | R22/R23                 | R22/R23                 | y                            |
| Durethan® BKV20FN01           | PA6            | GF18 FR          | x         |           | R22/R23                         | R22/R23                 | R22/R23                 | y                            |
| Durethan® BKV45FN04           | PA6            | GF45 FR(40)      | x         |           | R22/R23                         | R22/R23                 | R22/R23                 | y                            |
| Pocan® BFN4211                | PBT            | GF13 FR          | x         |           | R22/R23                         | R22/R23                 | R23                     | y                            |
| Pocan® BFN4231                | PBT            | GF25 FR          | x         |           | R22/R23                         | R22/R23                 | R23                     | y                            |
|                               |                |                  |           |           |                                 |                         |                         |                              |
| Amodel® HFFR-4133 BK324       | PPA            | GF33 FR          | x         |           |                                 | R22                     | R23                     | y                            |
|                               |                |                  |           |           |                                 |                         |                         |                              |
| Vampamid® 6 0024 V0           | PA6            | FR               | x         |           | R22/R23                         | R22/R23                 | R22/R23                 | y                            |
| Vampamid® 6 0024 V0 E 40 T DB | PA6            | FR               |           | x         | R22/R23                         | R22/R23                 | R22/R23                 | y                            |
| Vampamid® 6 3028 V0           | PA6            | GF30 FR          | x         |           | R22/R23                         | R22/R23                 |                         | y                            |
| Vampamid® 66 3028 V0          | PA66           | GF30 FR          |           |           | R22/R23                         | R22/R23                 |                         | y                            |
| Vampamid® 66 3028 V0 HF       | PA66           | GF30 FR          | x         |           | R22/R23                         | R22/R23                 | R22/R23                 | y                            |
| Vampamid® HT 3028 V0          | PPA            | GF30 FR          | x         |           | R22/R23                         | R22/R23                 | R22/R23                 | y                            |
| Vamplen® 0024 V0              | PP             | FR               | x         |           | R6                              | R6                      | R6                      | y                            |
| Vamplen® 0024 V0 C E          | PP             | FR               |           | x         | R22/R23                         | R22/R23                 | R22/R23                 | y                            |
| Vamplen® 2528 V0              | PP             | GF25 FR          | x         |           | R6/R22/R23                      | R6/R22/R23              | R22/R23                 | y                            |
| Vampalloy® 0024 V0 12 LSFT    | PC+ABS         | FR               | x         |           | R21/R22/R23                     | R21/R22/R23             | R21/R23                 | y                            |
| Vampalloy® 1527 V0            | PC+ABS         | MD15 FR          |           | x         | R22/R23                         | R22/R23                 | R22/R23                 | y                            |

\* may be wall thickness dependant

x suitable

o limited suitability

The information contained in this publication is based on our current knowledge and experience. However, due to the large number of factors that can influence our products when they are processed and used, it does not exempt processors from carrying out their own investigations and tests. Legally binding assurances of specific properties or of suitability for a specific purpose cannot be derived from our information. The recipient of our products is responsible for observing any applicable industrial rights as well as the existing laws and regulations.

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