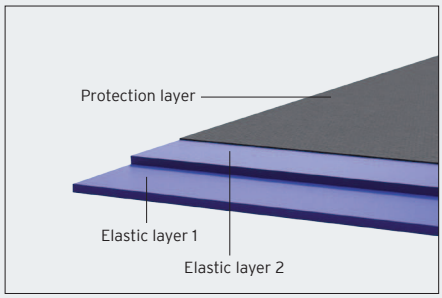
Guideline for the Installation **of Ballast Mats with 2 elastic layers**



1. General description

Getzner ballast mats are high-tech materials coping with extreme dynamic loads. They have an excellent resistance against all chemical substances normally used in railway services. Getzner ballast mats possess serviceability certificates in accordance with DIN 45673-5 (2010).

Ballast mats from Getzner, robust by nature, however some guidance for simple handling on site have to be taken into account to avoid loss in quality during application, i.e. loss and/or reduction in efficiency.

2. Delivery

Getzner ballast mats corresponding to the type, their thickness and weight are delivered in rolls and therefore very easy to handle. The side of the mats facing the ballast is protected by a geo-textile. This geo-textile has practically two functions – as a protective layer against ballast-grain penetration of the spring layer as well as a load-distribution layer throughout the load bearing area.

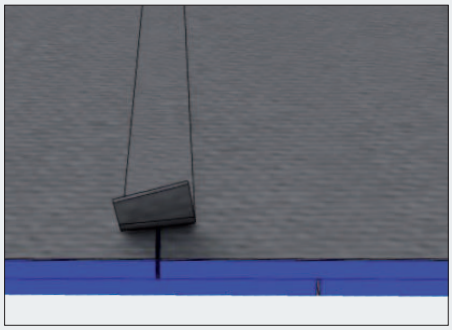
The ballast mats are delivered in a width of 1500 mm. The length of the mats (5000 mm – standard) usually meets the width of the track bed and is clarified with the client in advance. Getzner ballast mats for the highest demands on vibration mitigation are delivered with 2 elastic layers and the upper layer is equipped with the Geotextile to protect the high elastic layers from the ballast. The same principle applies to Getzner sidewall mat usually mounted and glued on slanting and vertical/perpendicular surfaces. The standard length of the Getzner sidewall mats are 1500 mm, whilst the width depends on the ballast depth or banking and will need coordination with the client in advance. Sidewall mats, like the ballast mats have no overlapping step joint.

3. Storage

To ensure fast installation Getzner ballast mats have to be kept dry and clean. The adhesive has to be frost-free. Ballast mats have to be protected against strong ultraviolet radiation. Therefore the continuous direct exposure to sunlight has to be avoided.

Installation

4. Installation



4.1 General

Please handle the Getzner ballast mats with care! To avoid soundbridges the area of installation has to be covered completely with ballast mats. The sub-base (e.g. bridge decks, tunnel floors) must be free of depressions and sharp-edged elevations.

Like every material Getzner ballast mats have a certain coeffient of thermal expansion. Therefore extreme weather or climate conditions can have an effect on the geometry of the mats. To avoid this ballasting on open tracks should be carried out immediately following the installation but no later than the end of each shift or working day. In case Getzner ballast mats are glued to the sub-base (see par. 4.4), vehicles with rubber tyres supplying ballast are able to drive at slow speed on the ballast mats, but not bulldozers and vehicles with sharp-edged treated tyres. Sudden breaking or acceleration must be avoided.

4.2 Preparation of the sub-base

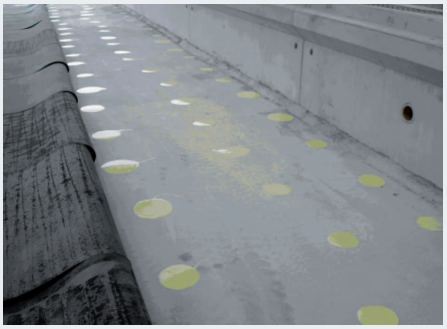
The sub-base has to be clean and dry, frost-free as well as free of depressions and sharp-edged elevations. Loose objects, e.g. stones, have to be removed. Multilayer ballast mats can generally be handled the same as single layer mats. Each layer is installed and glued separately. The detailed procedure is describes in chapter 4.4 and 4.5. To ensure optimum functionality the lower and upper layer are installed with an offset of minimum 100 mm but 1/2 of the ballast mat width is recommended.

4.3 Placing of ballast mats

The ballast mats are unrolled transversely to the centre of the track. Placed in their respective position with the black resilient layer facing the subgrade and, if necessary adjusted on site by cutting their geometry. Extreme temperatures and differences in temperature respectively or after long storage, the ballast mats should at first be unrolled, placed in position and left to settle for a few hours before gluing. This allows the material to recover from compression and stretching caused by rolling.

The installation can be carried out
as described.

4.4 Ballast mat adhesion to the subgrade



Avoiding displacement during ballasting, the mats can be glued to the sub-base. The adhesion must be longitudinally along the area of the track position and at the transition to the sidewall mats (about 100 mm at the edges).

The adhesive to be used depends on the respective ambient temperature (not less than +5 °C). Ideally a two-component solvent-free polyurethane adhesive is used. Roughly 0.3–0.5 kg adhesive per m^2 ballast mat is applied. Deviations in certain cases are possible.

The connection of the mats will be made by a getzner-specific welding machine and a strip of 10 cm which covers the slit between the USM. Alternative: the strip which covers the slit can also be glued by a PU-Adhesive. Subsequently to the ballast mats the sidewall mats are installed. They are mounted onto the ballast mats. To keep the overall calculated height, the thickness of the ballast mats is subtracted from the actual sidewall mats.

The installation on vertical surfaces is carried out by full-surface adhesion. Therefore a two-component bituminous mass (solvent-free, inorganic-bonding) or a two component solution PU adhesive is suggested. Roughly 1.0 kg adhesive per m^2 sidewall mat is applied. Deviations in certain cases are possible.

4.5 Obtuse joints

Joints should be sealed effectively by a suitable, at least 100 mm wide tape and adhesive strip made of the same geotextile as the protection layer (see par. 4.4). Gaps between single mats can occur through inaccuracy in installation, narrow radii and due to construction tolerances.

If gaps are less than 5 mm no additional measures other than described above are needed. If the radii are extremely narrow correction cuts are made after certain stages which are handled like obtuse joints.

All information and data is based on our current knowledge. Further Information can be found in our actual ballast mats brochure.