ALPE ADRIA TEXTIL

ASPHALT REINFORCEMENT WITH

ARTER® GTS A 50-50-35 GEOGRIDS

TECHNICAL MANUAL

ANALYSIS OF ASPHALT FAILURE

Crackings and surface rutting are the most visible signs of deterioration of asphalt pavements.
When a surface crack is formed, water can penetrate down to the lower layers of the road structure. Eventually the dry – wet and freeze – thaw cycles can cause the premature failure of the whole pavement.
There are several causes of asphalt failures, but they can be reduced to four basic mechanisms: reflective cracking, traffic failure, thermal failure, surface cracking.

Reflective cracking

In case of a new asphalt layer on an old one, already damaged, the mechanism of reflective cracking occurs, consisting in the propagation of crackings from the old layer to the new one, from bottom to top.
To avoid or limit the reflective cracking a separation Geosynthetic is required, able to force the crackings of the layer below to further propagate only horizontally, but not vertically into the layer above (*Fig. 1)*

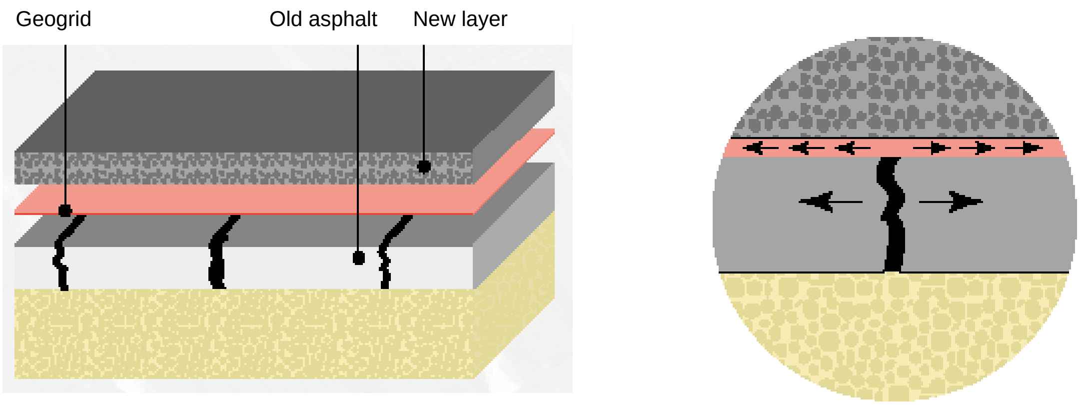

Fig. 1 – Effect of the insertion of a Geogrid on Reflective Cracking

Thermal failures

Asphalt and soil afford different elastic modulus and thermal deformation modulus: hence the freeze – thaw cycles necessarily produce a state of stress in the asphalt layer (that is a co-action), which tends to shrink and dilate in a different way than the soil below; the same occurs in case of a new asphalt layer placed on an old one, or in case of an asphalt layer on a concrete base.
Such co-actions, together with the fatigue cycles produced by the freeze (shrinkage) and thawing (dilation), with the fatigue cycles produced by loading and unloading due to vehicles passages, with the thrust due to ice formation within crakings, strongly contribute to the rapid deterioration of asphalt characteristics.
To avoid or limit the thermal crackings a reinforcement Geosynthetic is required, able to supply the asphalt with a tensile strength at low elongation and with a confinement effect on the aggregate for limiting the lateral deformations.
The most suitable Geosynthetics for this purpose are the high tenacity polyester Geogrids.

Traffic failures

Traffic, and particularly heavy traffic, produces fatigue cycles that stress the asphalt alternatively in tension and compression. Asphalt afford weak resistance to tensile stresses, hence fatigue cycles produce incremental and cumulative plastic deformations; when the asphalt reaches its limit deformation, traffic crackings occur.
Also for avoiding or limiting traffic crackings a reinforcement Geosynthetic is therefore required, able to provide asphalt with a tensile strength at low elongation and with a confinement effect on the aggregate for limiting the lateral deformations.

It is very important to keep the bond between the upper asphalt layer and the lower one, granted by the tack coat, in order for the two layers to act sinergically and to resist together the fatigue cycles. Unbonding of the two layers, on the other hand, produce accelerated cracking.
The most suitable Geosynthetics for playing the function of asphalt reinforcement are the high tenacity polyester Geogrids: thanks to their open structure Geogrids don't separate the upper and lower asphalt layers, therefore they are not a cause of unbonding of the two layers.

Surface failures

Dilation and compaction of the wearing course produce surface tensions which, beyond the limit resistance of the asphalt, induce the formation of surface crackings.
Surface stresses reach the maximum values during high temperature periods. Once a surface crack is formed, it propagates downward, with a "opening zip" effect. Water penetrates into the crack and reaches the lower layers. Eventually the dry – wet and freeze – thaw cycles may cause the premature failure of the whole pavement.
Hence surface failures, initiated in the hot months, provoke the maximum deterioration of the wearing course, and sometimes of the binder, during the cold months.
The best way to avoid such degradation phenomena is to avoid or delay the formation of surface crackings in the wearing course.
Since these crackings are due essentially to fatigue cycles, like in the previous case the best solution is to introduce a reinforcing Geogrid, able to provide a tensile strength at low elongation and a confinement effect on the aggregate.

PROPERTIES OF GEOSYNTHETICS FOR ASPHALT REINFORCEMENT

From the above analysis it is evident that asphalt reinforcement Geosynthetics must possess the following properties:

- High tensile strength and tensile modulus, in order to provide consistent tensile forces with minimum elongation;
- Very low viscous elongation (creep), in order to be able to resist the formation of incremental plastic deformation of asphalt over a long time;
- Capacity of lateral confinement of aggregates, hence open grid structure and not plain solid surface;
- High flexibility and drapebility, in order to lay flat on the asphalt surface without generating waves and without creating voids; sheets must lay flat on the supporting layer, without requiring nailing or pretensioning; moreover sheets shall not be resilient, in order to avoid the spring effect, which would produce undesirable stresses in the asphalt;
- Resistance to high temperatures, such to avoid the formation of waving and shrinkage which would produce further crackings in the asphalt;
- Easy fixing to the support layer with a tack coat, made up of pure bitumen or bituminous emulsion, and positive adhesion to the support, in order to avoid lifting of sheets by the wheels of the finisher and of the trucks;
- Capacity to keep the bond between the upper and lower asphalt layers, granted by the tack coat, without creating a separation between the two layers.

The capacity of confinement and the open structure, which on one hand allows aggregate confinement and on the other hand don't prevent the bond between the upper and lower asphalt layers, are peculiar characteristics of Geogrids.

The resistance to high temperatures is an intrinsic characteristic of the Geogrids polymer: while polyethylene and polypropylene show a softening point at lower temperature than asphalt laying temperature, polyester presents a higher softening point, at 265°C.

Flexibility and drapebility come from the production method used for Geogrids and from the unit weight of Geogrids: extruded Geogrids have high flexural rigidity and high unit weight, hence they present low flexibility; instead polyester woven/knitted Geogrids present low flexural rigidity and low unit weight, hence they afford high flexibility and drapebility.

It is also evident that the unit weight of Geogrids is inversely proportional to flexibility and laying easiness: for asphalt reinforcement, therefore, Geogrids with low unit weight are surely to be preferred.

Tensile and creep resistance are essentially characteristics due to the Geogrid polymer: it has to be noted that polyester affords a much higher tensile resistance per unit weight than polyethylene and polypropylene, and with minimum creep elongation.

The capacity of adhesion to the support depends strictly on the physical structure of the Geogrid: at equal open surface, a woven/knitted Geogrid with flat junctions, which adheres to the support with the full solid surface, surely affords a higher adhesion than an extruded Geogrid with round junctions, which adheres only with a small part of the solid surface.
Adhesion depends also on the composition of the external part of the Geogrid: woven/knitted Geogrids can be coated with a protective layer, made up of a polymer with low softening point and high surface friction, like PVC (which may generate toxic fumes) or EVA (much less toxic), which facilitate adhesion to the support; instead extruded Geogrids are made up of only one polymer (generically polyethylene or polypropylene) and present an extremely smooth surface, hence their adhesion results to be very weak.

Woven/knitted Geogrids don't show appreciable resiliency; on the other hand extruded Geogrids show characteristics of high resiliency and shape memory, that is they have the tendency, once unrolled, to go back to the curved shape of the roll, thus generating a high spring effect.

THE MOST SUITABLE GEOSYNTHETICS FOR ASPHALT REINFORCEMENT

From the above listed characteristics it is possible to assume that the most effective system for asphalt reinforcement is to use high tenacity polyester Geogrids, coated with a EVA protective layer: these Geosynthetics are able to confine the asphalt aggregate, to provide substantial tensile forces at low elongation and with minimum creep, to resist high temperatures, to adhere easily and surely to the support.

ARTER® GTS A GEOGRIDS

If in theory the most effective system for asphalt reinforcement is the use of high tenacity polyester Geogrids, in practice important problems have always been encountered, due mainly to the difficulty of getting a proper adhesion of the Geogrids (which usually show more than 80 % empty surface) to the supporting asphalt layer.

On the other hand nonwoven Geotextiles, utilized as well in asphalt pavements, result to be easy to install and show good adhesion to the support, since they have plain solid surface without macro apertures; but nonwoven Geotextiles have the function of separation and waterproofing (when impregnated with bitumen): they can delay the build-up and propagation of crackings from the lower layer, but they cannot provide any reinforcing action, due to their insufficient mechanical characteristics.

Recently AlpeAdria Textil has introduced a new type of Geogrid, specifically developed for asphalt reinforcement, named ARTER® GTS A 50-50-35.
This product is able to provide the high mechanical characteristics of polyester Geogrids and at the same time to guarantee an adhesion to the support similar to the one of nonwoven Geotextiles.

Such result has been obtained thanks to a network of thin threads, introduced in the textile phase into the main meshes of the Geogrid, as shown in *Fig. 2*.

Moreover the ARTER® GTS A Geogrid is produced with the K-DOS method, that is by warp knitting with weft insertion and textile fixing of junctions: in this way the Geogrid structure, having fixed junctions, affords an optimal dimensional stability and a high capacity of aggregate confinement.
Therefore ARTER® GTS A Geogrids perfectly adhere to the support layer without creating a separation between the binder and the wearing course: the asphalt of the wearing course is confined by the Geogrid, while being perfectly bonded to the binder.

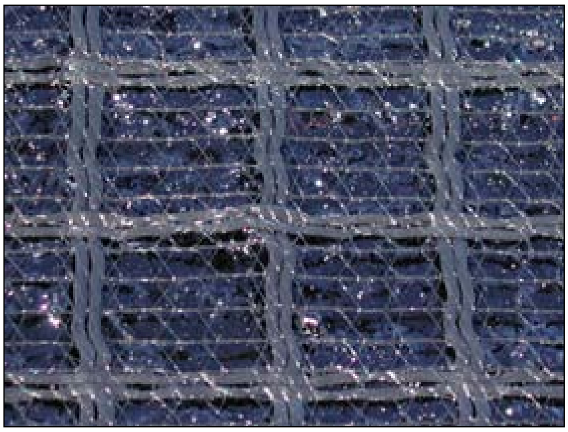

Fig. 2 - A network of thin threads guarantees an optimal adhesion to the underlying asphalt layer.

Fig. 3 – The ARTER® GTS A geogrids are rolled with a very thin polyethylene sheet

The textile structure of ARTER® GTS A geogrids is entirely covered with a protective polymeric coating, made up of EVA (Ethilene Vinil Acetate).
This polymer presents a low softening point at 135°C approx. During the lay-down of asphalt the EVA layer partially melts, thus contributing to the adhesion of the Geogrid to the sub-layer.

ARTER® GTS A geogrids are rolled with the interposition of a very thin Polyethylene sheet *(see Fig. 3),* which allows to keep the product intact and provide an easy and quick installation method, as explained in next paragraph.

When the wearing course and the binder are not perfectly bonded, the shear stresses produced by acceleration and mainly by braking of heavy vehicles cannot be entirely transmitted to the binder, thus the wearing course may be subject to local delamination.
Delaminated areas are then subject to increased stress and degrade quickly, with the formation of permanent rutting, cracking and deformation of the road surface.

ARTER® GTS A Geogrids allow to avoid such problem, since they provide an effective reinforcement element, able to provide adequate resistance to fatigue stress due to vehicles passage, without impairing the resistance to shear stresses.

As a result of the introduction of ARTER® GTS A Geogrids the life time of the wearing course is enhanced by a factor of 3 to 10, as a function of asphalt and subgrade characteristics, and of the quality of installation.

The use of ARTER® GTS A Geogrids is suitable for:

- repaving of deteriorated old asphalt layers *(Fig. 4);*
- widening of roads and airport runways and taxiways (*Fig. 5);*
- joints of bridge decks and road pavings;
- areas prone to differential settlements;
- reconstruction of paving over excavation areas.

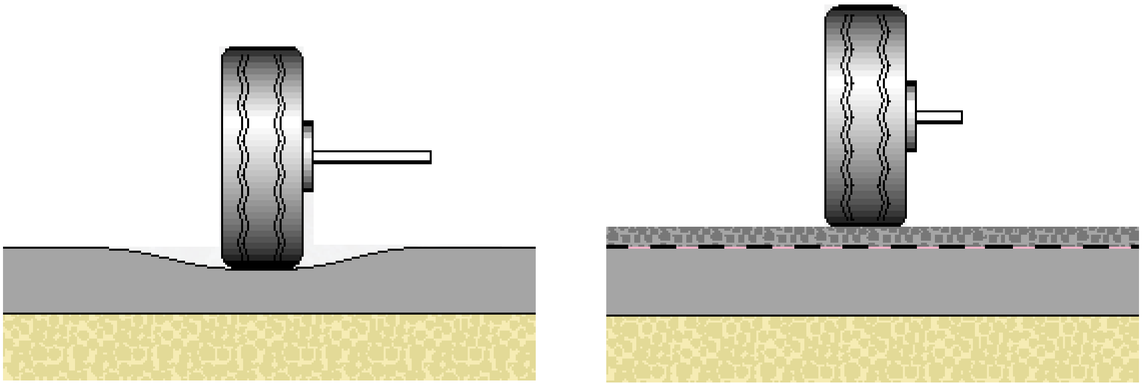

Fig. 4 – Use of ARTER® GTS A Geogrids for repaving deteriorated old asphalt layers

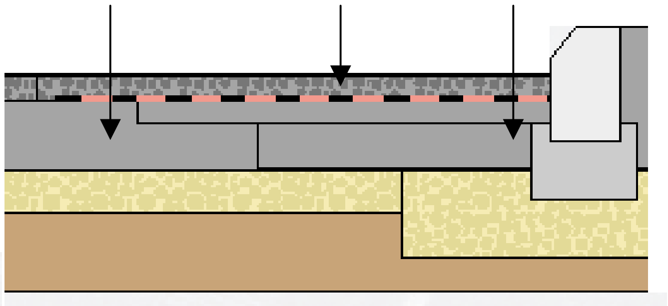

Fig. 5 – Use of ARTER® GTS A Geogrids for widening of roads and airport runways and taxiways

INSTALLATION

ARTER® GTS A geogrids are rolled with the interposition of a very thin Polyethylene sheet *(see Fig. 3)*, which allows to keep the product intact and provide an easy and quick installation method: in fact, by pulling the Polyethylene sheet, the Geogrid unrolls uniformly on the support layer, without creating folds or waves *(Fig. 6)*.
Therefore two workers can lay down a whole roll of ARTER® GTS A geogrids, 100 m long, in few minutes *(Fig. 7)*.

Fig. 6 – By pulling the Polyethylene sheet, the Geogrid unrolls uniformly on the support layer, without creating folds or waves

Fig. 7 - Two workers can lay down a whole roll of ARTER® GTS A   geogrids, 100 m long, in few minutes

The procedure for the installation of ARTER® GTS A geogrids for asphalt reinforcement is the following:

1) keep ARTER® GTS A geogrid rolls in a dry and clean area; don't stack rolls to avoid deformations;
2) if required, mill the old wearing course;
3) smooth and clean the surface: remove dust and oil spills; fill the grooves larger than 20 mm; main irregularities shall be eliminated either by milling or filling with 20 mm asphalt; milling grooves shall not be deeper than 10 mm;
4) spray the tack coat, preferably made up of pure bitumen, at a rate of 0,30 – 0,50 l/sqm, or of cationic emulsion, 50 % bitumen and 50 % water, at a rate of 0,80 – 1,20 l/sqm, from a tank truck with spraying bar *(Fig. 8);* sprayed bitumen temperature shall be lower than 145°C; sprayed area shall be 200 mm wider than the Geogrid;
5) in case of bitumen emulsion, wait about 1 hour until the emulsion breaks and the water completely evaporates;
6) lay the ARTER® GTS A geogrids, taking care to keep it smooth on the support layer, without folding or waving: first position the roll; fix the roll, at the beginning with large headed nails or by laying a small quantity of asphalt on the first metre *(Fig. 6);* unroll the Geogrid by pulling the Polyethylene sheet *(Fig. 7, 8);* smooth down any remaining folding and waving; cut the Geogrid around any hitch or trap *(Fig. 9);* overlapping of contiguous rolls shall be 100 mm wide along side edges and 150 – 200 mm at roll end, with the new roll placed below the edge of the previous roll; rolls shall be unrolled along the road axis or anyway in the same direction of the finisher movement; in case of uneven surface, in order to avoid lifting of the Geogrid, or folding and waving during the next passages of truck and finisher, the Geogrid may be pretensioned by pulling (by means of a winch or a truck) a steel bar passing in and out the geogrid meshes at the end of the roll: such tension shall produce a 0.2 % elongation of the Geogrid, that is 200 mm over a 100 m roll; while keeping the Geogrid in tension, it shall be fixed with nails or loaded with asphalt at both ends and in case along side edges; to avoid lifting of the Geogrid by truck or finisher wheels, it is possible to lay sand or chipping or cement powder in case that small detachments are detected;

Fig. 8 – Spraying of the tack coat from a tank truck with spraying bar.

Fig.9 – A small quantity of asphalt on the first metre of Geogrid and along side edges allows to keep the roll in the right position.

7) in case of curves or special geometries, cut the Geogrid in size pieces, including the overlapping width as above described; in case of formation of waves, cut the Geogrid at the center of the wave, fold the two edges, overlap and fix down;
8) lay the wearing course in 60 mm loose thickness, by means of the finisher (Fig. 9); usually the Geogrid doesn't suffer damages or lifting caused by the tyres; anyway trucks and finisher shall move very slowly and smoothly over the Geogrid, avoiding sharp curves and braking;
9) roll the asphalt to a finished thickness of 50 mm with a steel drum roller;
10) smooth asphalt around hitches and traps and complete with all details.

The whole procedure can be carried out with non qualified labour and with common machines for asphalt works.

Installation of ARTER® GTS A Geogrid usually doesn't cause any increment in working time, since Geogrid laying operations are carried out in parallel while doing the other works, in areas immediately before or after.

Fig. 10 – Manual cut of the Geogrid around hitches and traps

Fig. 11 – Laying the asphalt in 60 mm loose thickness by a finisher

PRACTICAL RESULTS

Recently ARTER® GTS A Geogrids have been used for the reinforcement of the new wearing course within the repaving works of Buttrio street, in Pozzuolo del Friuli town (Udine province, north eastern Italy).
One week after installation asphalt samples have been bored through a Milwaukee Cat. No. 4004/4 machine, equipped with 160 mm diameter borer *(see Fig. 12).*
Both samples of asphalt reinforced with ARTER® GTS A geogrids and samples of unreinforced asphalt have been bored. In fact an area has been repaved with the same asphalt, unreinforced, following the same procedures as for the reinforced one.
Samples have been sent to a Laboratory for performing index tests and mechanical tests.
Eventually results will be presented in a specific publication.
Visual examination of samples allowed anyway to get important preliminary results:

Fig. 12 - Asphalt boring with a Milwaukee Cat. No. 4004/4 machine, equipped with 160 mm diameter borer

- both the reinforced and the unreinforced samples show good adhesion of the wearing course to the binder *(Fig. 13);*
- ARTER® GTS A Geogrid is perfectly incorporated into the asphalt and no sign of separation between the wearing course and the binder appears (Fig. 14).

Fig. 13 – The unreinforced samples

The installation of the new wearing course, reinforced with ARTER® GTS A Geogrids, yielded the following results:

- during rolling operations, the asphalt, confined by the Geogrids, doesn’t slip forward in front of the roller, hence waving of the asphalt surface doesn’t occur;
- as a consequence, asphalt surface results smooth and uniform *(Fig. 15);*
- the new wearing course shows an excellent adhesion to the milled subgrade;
- Geogrids didn’t suffer any damage during installation and are therefore able to provide the wearing course with an effective confining and reinforcing action;
- the wearing course results actually reinforced and yields higher resistance and durability.

Preliminary results of laboratory tests on reinforced and unreinforced asphalt samples show that:

- reinforced asphalt specimens yields a higher breaking load than unreinforced ones;
- reinforced asphalt specimens show a smaller deformation under load than the unreinforced ones;
- unreinforced specimens show, at failure, a single and large cracking, while the reinforced specimens break at higher load and higher deformation, showing a network of finely divided crackings;
- Geogrids delay or even eliminate the propagation of cracks upward into the new wearing course, just thanks to the limited width of the cracks;
- Geogrids yield, even in the post cracking phase, a high level of resistance to traffic loads for the reinforced course in comparison with the unreinforced one;
- Practical experience show that a reinforced asphalt course actually reach a life time 3-fold to 10-fold larger than an unreinforced one.

Fig. 14 - The reinforced samples.

Fig. 15 – Asphalt surface results smooth and uniform

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(2) Barksdale, R.D., Brown, S.F. and Chan, F., (1989).“Potential benefits of geosynthetics in flexible pavement systems”, National Cooperative Highway Research Program Report. AASHTO, USA.

(3) Cancelli A., Montanelli, F. and Rimoldi, P., Zhao, A. (1996), “Full scale laboratory testing on geosynthetics reinforced paved roads”, Proc. Int. Sym. on Earth Reinforcement, Kyushu, Giappone.

(4) Gregory G.H. and Bang S., (1994), “Design of flexible pavement subgrades with geosynthetics”, Proc. of 30th Symp. Eng. Geology and Geotechnical Eng.

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ARTER® GTS A/50-50-35 GEOGRIDS FOR ASPHALT REINFORCEMENT

ARTER® GTS A/50-50-35 Geogrids have been specifically developed for asphalt reinforcement.

ARTER® GTS A/50-50-35 Geogrids are composed of polyester yarns, and of a network of thin polyester threads, introduced in the textile phase into the main meshes of the Geogrid, for improving the adhesion to the support layer.

Polyester fibres afford important technical properties, such as: resistance to high temperatures, thanks to the softening point at 265°C; very high elastic modulus; very low viscous elongation under constant load (creep); good chemical inertia, but for extreme pH values.
Polyester fibres can be woven or knitted in Geogrid form, thus yielding a Geosynthetic with high tensile strength, excellent frictional properties, capacity of aggregate confinement, high temperature resistance, high durability.

ARTER® GTS A/50-50-35 Geogrids are able to provide the high mechanical characteristics of polyester Geogrids and at the same time to guarantee an adhesion to the support similar to the one of nonwoven Geotextiles.
Such result has been obtained thanks to the network of thin polyester threads, introduced in the textile phase into the main meshes of the Geogrid.
Moreover the ARTER® GTS A Geogrid is produced with the K-DOS method, that is by warp knitting with weft insertion and textile fixing of junctions: in this way the Geogrid structure, having fixed junctions, afford an optimal dimensional stability and a high capacity of aggregate confinement.
Therefore ARTER® GTS A Geogrids perfectly adhere to the support layer without creating a separation between the binder and the wearing course, since these Geogrids are not a separation element: the asphalt of the wearing course is confined by the Geogrid, while being perfectly bonded to the binder.

The textile structure of ARTER® GTS A geogrids is entirely covered with a protective polymeric coating, made up of EVA (Ethilene Vinil Acetate). This polymer presents a low softening point at 135°C approx. During the lay-down of asphalt the EVA coating partially melts.

ARTER® GTS A geogrids have been specifically developed for asphalt reinforcement, both for the binder and the wearing course, both for new roads and for repaving of old courses.
ARTER® GTS A geogrids withstand asphalt temperatures without any damage, allow to delay or even eliminate the reflective cracking, increase the elastic modulus of asphalt layers, absorb the tensile stresses caused by vehicles passage, allow the asphalt to withstand a much larger number of fatigue cycles.
ARTER® GTS A geogrids are effective reinforcing elements, able to provide asphalt with adequate fatigue resistance without impairing the shear stress resistance.
As a result of the introduction of ARTER® GTS A geogrids the life time of the wearing course is enhanced by a factor of 3 to 10, as a function of asphalt and subgrade characteristics, and of the quality of installation.

ARTER® GTS A geogrids are rolled with the interposition of a very thin Polyethylene sheet, which allows to keep the product intact and affords an easy and quick installation: by pulling the Polyethylene sheet, the Geogrid unrolls smoothly on the sub-layer, without folds nor waves.
Hence two workers can install a full roll of geogrid, 100 m long, in few minutes.

The use of ARTER® GTS A Geogrids is suitable for:

- repaving of deteriorated old asphalt layers;
- widening of roads and airport runways and taxiways;
- joints of bridge decks and road pavings;
- areas prone to differential settlements;
- reconstruction of paving over excavation areas.

DATA SHEET

ARTER® GTS A/50-50-35

PROPERTIES			UNIT	VALUES	TEST
Struttura	Structure	Struktur		**K D.O.S.**	**-**
Composizione	Composition	Zusammensetzung		**PET - EVA**	**-**
Massa areica	Mass per unit area	Masse pro Flächenneinheit	**g/m²**	**215**	**UNI EN 965**
Resistenza a trazione longitudinale	Tensile strength M.D.	Zugfestigkeit längs	**kN/m**	**50**	**UNI EN ISO 10319**
Deformazione longitudinale	Elongation M.D.	Dehnung längs	**%**	**12**	**UNI EN ISO 10319**
Resistenza a trazione trasversale	Tensile strength C.D.	Zugfestigkeit quer	**kN/m**	**50**	**UNI EN ISO 10319**
Deformazione trasversale	Elongation C.D.	Dehnung quer	**%**	**12**	**UNI EN ISO 10319**
Resistenza longitudinale al 2% di deformazione	Strength M.D. at 2% elongation	Festigkeit längs bei 2% Dehnung	**kN/m**	**13**	**UNI EN ISO 10319**
Resistenza longitudinale al 3% di deformazione	Strength M.D. at 3% elongation	Festigkeit längs bei 3% Dehnung	**kN/m**	**18**	**UNI EN ISO 10319**
Resistenza longitudinale al 5% di deformazione	Strength M.D. at 5% elongation	Festigkeit längs bei 5% Dehnung	**kN/m**	**26**	**UNI EN ISO 10319**
Resistenza longitudinale al 10% di deformazione	Strength M.D. at 10% elongation	Festigkeit längs bei 10% Dehnung	**kN/m**	**>50**	**UNI EN ISO 10319**
Apertura di maglia	Mesh size	Maschenweite	**mm**	**35**	**EN ISO 30320**
Larghezza del rotolo	Roll width	Rollebreite	**m**	**2,65 - 4,40 - 5,30**	**EN ISO 30320**
Lunghezza del rotolo	Roll length	Rollelänge	**m**	**100**	**EN ISO 30320**

K Maglieria in catena con inserzione di trama
NW Nontessuto PP
DOS Strutture Orientate Direzionalmente
PP Polipropilene
PET Poliestere
EVA Etilenvinilacetato

I dati tecnici elencati possono subire le variazioni ritenute più opportune senza preavviso alcuno.

E' norma tassativa richiedere la conferma dei dati riportati nella presente scheda

I test sono effettuati da laboratori esterni e controllati, secondo le prescrizioni della norma DIN 18200 da istituti indipendenti.

Prodotti con caratteristiche speciali possono essere forniti su richiesta.

K Warp knitting with weft insertion
NW Nonwoven PP
DOS Directionally Oriented Structures
PP Polypropylene
PET Polyester
M.D. Machine Direction
C.D. Cross Direction
EVA Ethylene-vynilacetat

The technical data shown may be subject to modifications that are considered more suitable without prior notice.

Confirmation of the data shown on the technical sheet must, therefore, be requested.

The tests are carried out by external laboratories and checked by independent institutes according to DIN 18200 standards.

Products with particular characteristics can be supplied upon request.

K Kettenwirk mit Schüßeintrag
NW Vliesstoffe PP
DOS Direkt Orientirten Structuren
PP Polypropylen
PET Polyester
EVA **Ethylen-vynilacetat**

Die angeführten technischen Daten können ohne Vorankündigung abgeändert werden, wenn diese für angemessen erachtet werden.

Die Einforderung der Bestätigung der in diesem Blatt angeführten Daten ist aber verpflichtend.

Die Tests werden von kontrollierten, externen Labors gemäß den Vorschreibungen der DIN-Norm 18200 von unabhängigen Instituten durchgeführt.

Produkte mit speziellen Eigenschaften können auf Wunsch geliefert werden

ARTER® GTS A 50-50-35

POLYESTER GEOGRIDS FOR ASPHALT REINFORCEMENT

TENDER SPECIFICATION

Supply of Geogrids produced by warp knitting with weft insertion of high tenacity polyester yarns, having high tensile strength and chemical, physical and biological inertia.
Geogrids shall have a plain structure of longitudinal and transversal ribs, making up a regular distribution of square apertures. Longitudinal and transversal ribs shall be linked by connecting polyester threads, extending into the apertures to form a fine network with 5 – 8 mm mesh.
The textile structure of the Geogrid shall be entirely coated with a protective EVA (Ethilene Vinil Acetate) layer.
The Geogrid shall be placed on the subgrade, previously sprayed with pure bitumen or cationic bitumen emulsion at 50 % water content, at a rate of 0.3 – 0. 5 l/sqm residual bitumen.
The plain structure of the Geogrid and the network of fine threads within the apertures shall allow the perfect adhesion of the Geogrid to the support, without becoming a separation element.
Asphalt shall then be laid on the geogrid, with 50 mm minimum thickness, using traditional techniques.
Geogrids shall be delivered to site in rolls, labelled according to ISO 10320 standard, shall be supplied with Conformity Certificate and Quality Control Certificate, according to ISO 9001 standard, and shall correspond in all aspects to the following characteristics:

- Polymer of fibres — 100% PET (high tenacity polyester)
- Polymeric coating — EVA (Ethilene Vinil Acetate)
- Mass per unit area (UNI EN ISO 965) — 215 g/m^2
- Roll width — 2,65 m, or 4,40 m or 5,30 m
- Roll length — 100 m
- Mesh aperture — 35 mm
- Tensile strength Longitudinal (UNI EN ISO 10319) — 50,0 kN/m
- Tensile strength Transversal (UNI EN ISO 10319) — 50,0 kN/m
- Yield point elongation (UNI EN ISO 10319) — 12%
- Tensile strength at 2 % elongation (UNI EN ISO 10319) — 13,0 kN/m
- Tensile strength at 5 % elongation (UNI EN ISO 10319) — 26,0 kN/m

Unit price of material delivered to site — Euro/m² ………………