

3sgeotech

3S geotecnia y tecnologia s.l.

GRUPO 3SGEOTECH

3SGEOTECH® ROCKFALL PROTECTION KITS WITH STEEL WIRE MESH TYPE 3STUTOR® PLUS



3S GEOTECNIA Y TECNOLOGÍA S.L.

*Development, Production and Marketing of Products and Systems
for Slope Stabilization and Rockfall Protection Kits*

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3SGEOTECH® ROCKFALL PROTECTION KITS WITH 3STUTOR® PLUS MESHES

3S Geotecnia y Tecnología S.L. has developed a wide range of rockfall protection kits based on the use of high tensile strength and low structural deformation wire meshes type **3STUTOR® Plus** as catchment surface.

These types of rockfall protection kits have been designed using rational calculation model based on the superposition of consumed energy by deformation of their components. This model of behavior has been contrasted in Lucerna (Switzerland) through different tests made in a certified test area.

• Characteristics of 3SGEOTECH® Rockfall Protection Kits:

- Sequential and controlled energy dissipation adapted to location requirements.
- High capacity of energy absorption due to the installation of the new brakes 3S-DPL.
- Systems with calculable and controlled deformation.
- Multi-impact systems with low maintenance requirements.
- Minimum permeability and low visual impact due to its catchment surface.
- High level of certification of all its components.
- Easy to install due to its modulate design.
- High corrosion protection.



STEEL WIRE MESHES TYPE 3STUTOR® PLUS

High tensile strength and low structural deformation wire meshes type **3STUTOR® Plus** have been completely designed and produced by **3S Geotecnia y Tecnología S.L.** for its use in structural applications. These meshes offer strength adapted to different requirements of rockfall protection system and high corrosion protection.



Mechanical characteristics of 3STUTOR® Plus meshes			
Mesh type 3STUTOR® Plus	100/4,0	100/4,5	90/4,5
Nominal diameter of the steel wire, (mm)	4,0	4,5	4,5
Nominal tensile strength of the wire, (N/mm ²)	900		
Tensile strength of the mesh (T _{y Rolura}), (kN/m)	135	170	205
Punching strength of the mesh with EAGLE plate (T _p), (kN)	70	100	100
Types of corrosion protection	3STUTOR® Plus / 3STUTOR® Plus Ultra		
Minimum corrosion resistance obtained in salt spray tests according to ASTM B 117, DIN SS 50021	3.000 h / 4.000 h		
Minimum equivalent durability for environment C2 according to EN ISO 9223	300 years / 400 years		
Type of protective coating according to EN-10244-2	Over than "Class A"		

3SGEOTECH BELIEVES IN INNOVATION AND DEVELOPMENT



Certification tests of dissipaters type 3S-DPL in collaboration with Cantabria University

3S Geotecnia y Tecnología S.L. has designed and developed the new Longitudinal Plastic Dissipaters **3S-DPL**:

- Defined load of activation.
- High braking efficiency with a horizontal and controlled graphic of energy dissipation.
- Unique reversible dissipaters in the market (which can be used in multiple impacts due to they are reusable when energy design is equaled due to a rockfall event).
- High efficiency, low cost and low maintenance brakes system.
- Range of brake energy:

Energy dissipation capacity of 3S-DPL dissipaters		
3S-DPL[®] 1	3S-DPL[®] 2	3S-DPL[®] 3
60 Kj/m	100 Kj/m	140 Kj/m

RANGE OF BARRIERS TYPE 3SGEOTECH[®] WITH 3STUTOR[®] PLUS MESHES

3S Geotecnia y Tecnología S.L. offers a wide range of dynamic barriers composed by steel wire meshes type **3STUTOR[®] Plus** with the objective to propose a rational and appropriate protection system for most common energy levels of rockfalls produced in nature (energy consume levels until 1.000 kJ).

Dinamyc barriers type 3SGEOTECH [®] for rockfall protection with 3STUTOR [®] Plus meshes					
Behavior	Denomination	Desigantion by EOTA (ETAG 27)		Catchment surface	Energy dissipater installed
		Class	Category		
Elastic	3S - 100 E	Class 0 (MEL ≥ 100 kJ)	Category A (H _{residual} ≥ 50%)	Mesh type 3STUTOR [®] Plus 100/4,0	Not necessary
	3S - 150 E	Class 0 (MEL ≥ 150 kJ)		Mesh type 3STUTOR [®] Plus 100/4,5	3S-DEL [®] 4/3
	3S - 250 E	Class 1 (MEL ≥ 250 kJ)		Mesh type 3STUTOR [®] Plus 90/4,5	3S-DEL [®] 5/4
Elastoplastic	3S - 400 EP	Class 1 (MEL ≥ 250 kJ)		Mesh type 3STUTOR [®] Plus 90/4,5	3S-DPL [®] 1 & 2
	3S - 500 EP	Class 2 (MEL ≥ 500 kJ)		Mesh type 3STUTOR [®] Plus 90/4,5	3S-DPL [®] 1 & 2
	3S - 750 EP	Class 2 (MEL ≥ 500 kJ)		Mesh type 3STUTOR [®] Plus 90/4,5	3S-DPL [®] 1 & 2
	3S - 1.000 EP	Class 3 (MEL ≥ 1.000 kJ)	Mesh type 3STUTOR [®] Plus 90/4,5	3S-DPL [®] 2	

All of these rockfall protection kits have been designed to work sequentially according to energy requirements demanded by a rockfall impact. Its design allows to work inside of the elastic range for the majority of the rockfall events (low impacts). Then, sequential activation of dissipaters is produced until to totally consume the design energy. At first time, perpendicular dissipaters are activated and finally the dissipaters installed in the barrier surface.

SOME WORKSITES WHERE 3SGEOTECH® ROCKFALL PROTECTION KITS HAVE BEEN INSTALLED

Dynamic Barrier 3S-100 E y 3S-150 E
Total length installed: 1.400 m
Protection height: 2,0 m / 3,0 m
Romeral Mine, La Serena, Chile.
Customer: CAP Minería



Dynamic Barrier 3S-150 E
Barrier with controlled deformation
Total length installed: 100 m
Protection height: 3,0 m
Railway line Eibar, Guipúzcoa, Spain.
Customer: ETS - Euskal Trenbide Sarea

Dynamic Barrier 3S-400 EP
Protection height: 3,0 m
Road CA-260, Cantabria, Spain
Customer: Cantabria Government



Dynamic Barrier 3S-750 EP
Protection height: 4,0 m
National road N-121, Navarra, Spain
Customer: Construcciones Mariezcurrena



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