

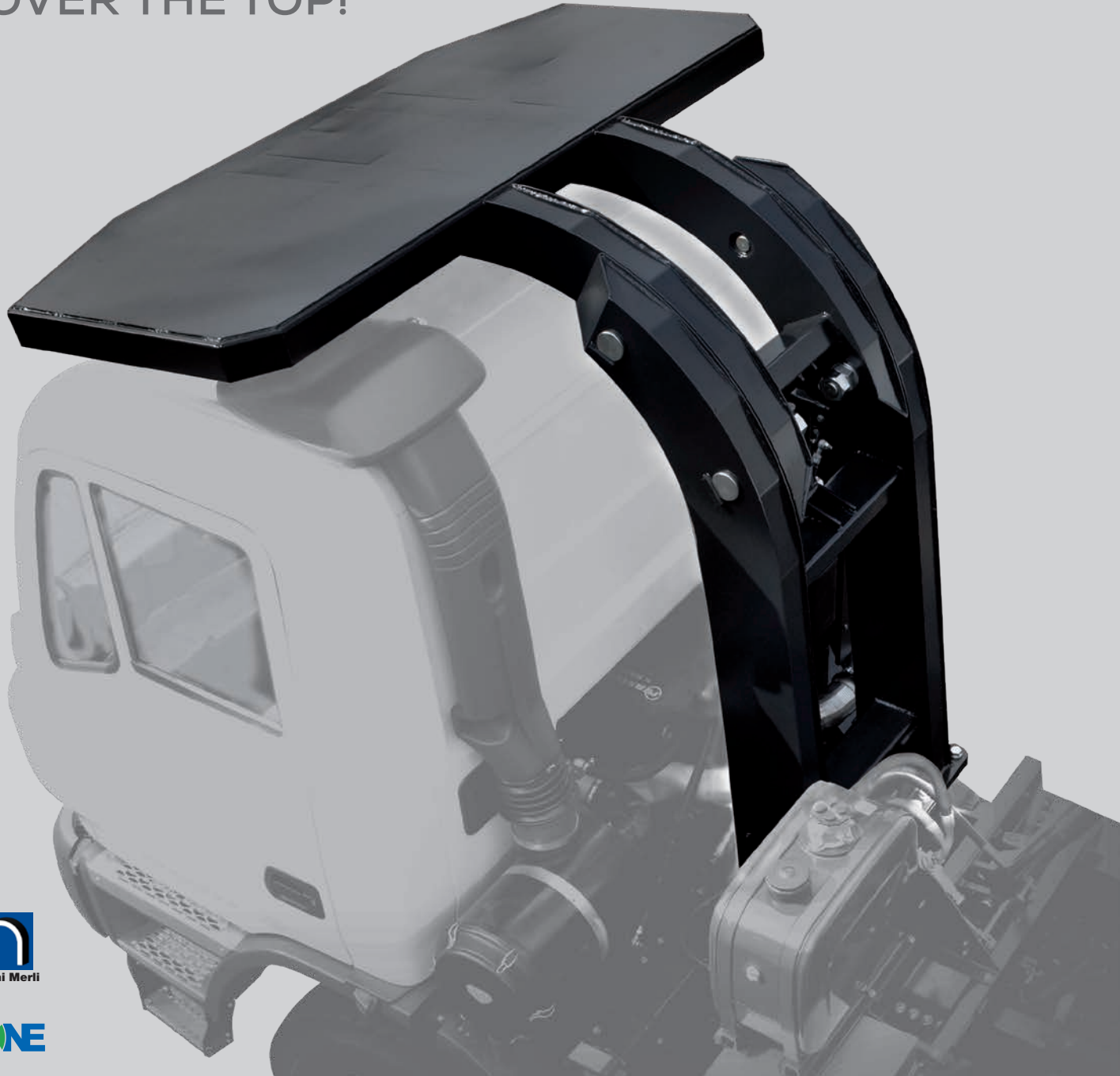
DEFENDER

ROPS – FOPS

PATENTED REGISTRATION
Nr. PCT/IB2012/050431

SAFETY

OVER THE TOP!



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STRUTTURE DI PROTEZIONE PER
IL RIBALTAMENTO E CADUTA OGGETTI

PROTECTION STRUCTURES FOR
ROLL-OVER AND FALLING OBJECTS



European Regulations

Directive 2006/42/EC on machinery (Section 3.4: PROTECTION AGAINST MECHANICAL HAZARDS)

ROPS ROLL-OVER AND TIP-OVER (Section 3.4.3)

Where, in the case of self-propelled machinery with a ride-on driver, operator(s) or other person(s), there is a risk of rolling or tipping over, **the machinery must be fitted with an appropriate protective structure**, unless this increases the risk.

This structure must be such that in the event of rolling or tipping over it affords the ride-on person(s) an adequate deflection-limiting volume.

In order to verify that the structure complies with the requirement laid down in directive 2006/42/EC, the manufacturer or his authorised representative must, for each type of structure concerned, perform appropriate tests or have such tests performed.

FOPS FALLING OBJECTS (section 3.4.4)

Where, in the case of self-propelled machinery with a ride-on driver, operator(s) or other person(s), there is a risk due to falling objects or material, **the machinery must be designed and constructed in such a way as to take account of this risk and fitted, if its size allows, with an appropriate protective structure**.

This structure must be such that, in the event of falling objects or material, it guarantees the ride-on person(s) an adequate deflection-limiting volume.

In order to verify that the structure complies with the requirement laid down in directive 2006/42/EC, the manufacturer or his authorised representative must, for each type of structure concerned, perform appropriate tests or have such tests performed.

International Regulations

ISO 3471

ROPS ROLL-OVER PROTECTIVE STRUCTURES

This International Standard specifies performance requirements for metallic roll-over protective structures (ROPS) for earth-moving machinery, as well as a consistent and reproducible means of evaluating the compliance with these requirements by laboratory testing using static loading on a representative specimen. It's applicable to ROPS intended for the following mobile machines with seated operator and with a mass greater than or equal to 700 kg.

For **DEFENDER** the test loads are the following:

- Lateral load force: 259000 N (26 tons)
- Vertical load force: 353000 N (36 tons)
- Longitudinal load force: 138000 N (14 tons)

The structure, during the test, must:

- Resist (not crash);
- Warp (be able to absorb energy of minimum deformation permitted);
- Protect the driver (warp without crush the driver, and prevent that, during the roll-over, the driver is crushed between vehicle and ground).

ISO 3449

FOPS FALLING-OBJECT PROTECTIVE STRUCTURES

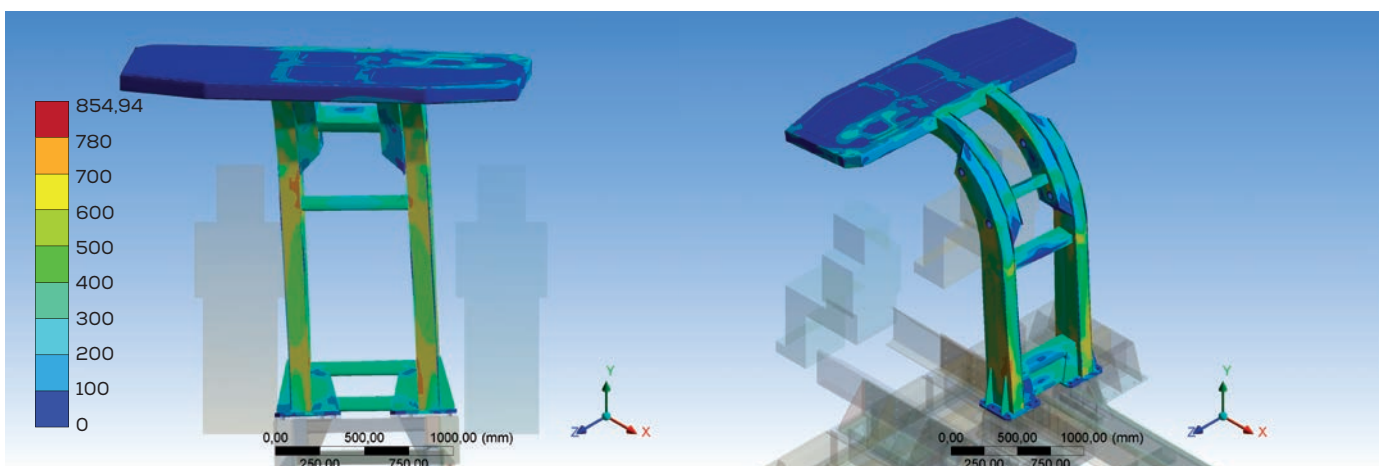
This International Standard specifies laboratory tests for measuring the structural characteristics and gives performance requirements in a representative test for falling-object protective structures (FOPS) intended for use on ride-on earth-moving machines. It is applicable to both FOPS supplied as an integral part of the machine and those supplied separately for attachment to the machine.

For **DEFENDER**, the LEVEL II impact protection, defined by the rule, requires:

- Drop object mass: 240 Kg
- Height of fall: 5 m

The structure, during the test, must:

- Resist (not crash);
- Warp (deformation is permitted);
- Protect the driver (warp without crush the driver).



TECHNICAL SPECIFICATIONS

WEIGHTS

- Weight of structure DEFENDER: 600 kg
- Weight of component for fixing at the chassis: 380 kg
- Maximum machine mass: 18000 kg

This mass, defined by ISO 3471:

- includes: weight of vehicle, weight of the ROPS protection, weight of auxiliary chassis;
 - excludes: weight of the tipper and everything contained in it.
- Protection Level of FOPS: LEVEL II.

If required, we can create a structure for vehicle with a weight greater than 17000 kg.

INDEPENDENT STRUCTURE

- The protection structure defender is fixed on the chassis;
- It doesn't require any operations on the cab;
- The structure will be compatible with cabs made according to ECE R29: this regulation does not allow modifications on the cab, unless the cab will be approved again.

THE PROTECTION STRUCTURE CAN BE SUPPLIED

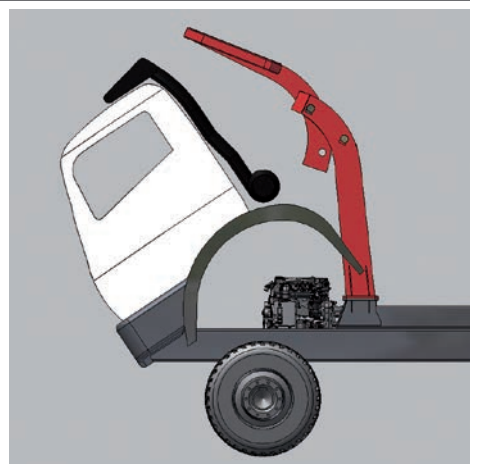
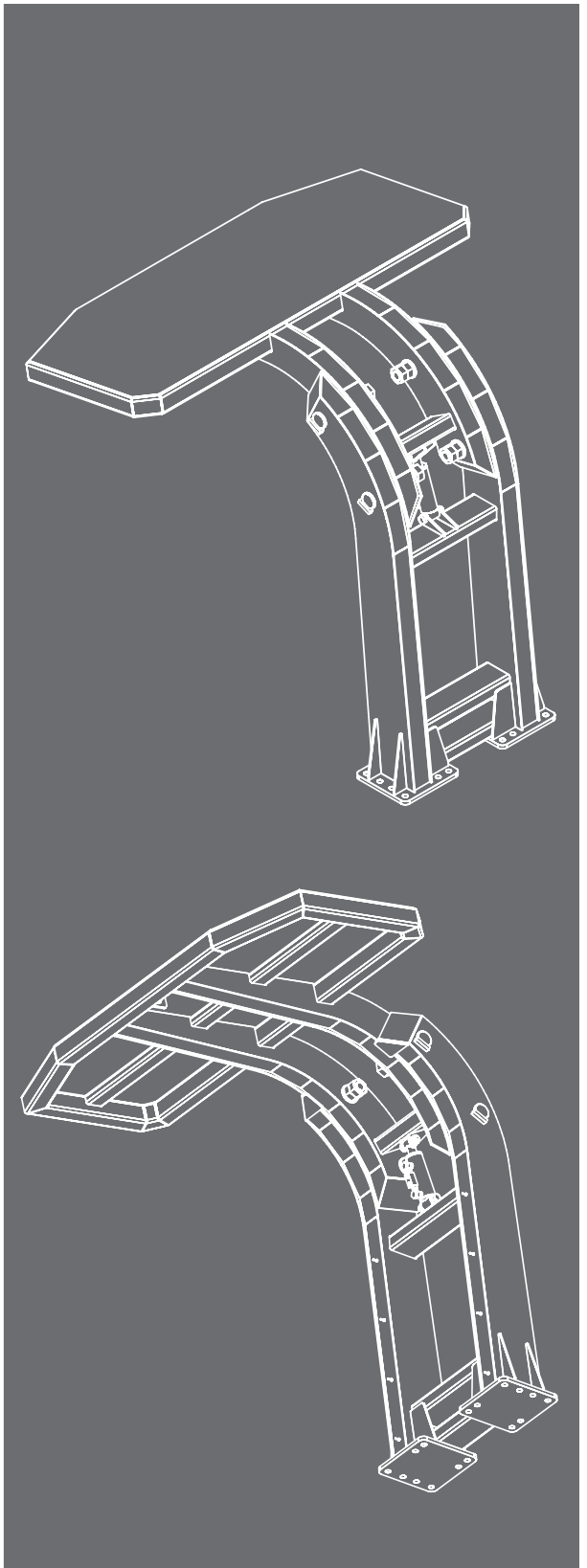
- With EC declaration and CE conformity marking:
 - for defender protection (a prototype passed the test of the regulation), reference standard is written on a identification plate.

In Europe the directive 2006/42/EC on machinery requires the use of certificated protection structures.

- With a report of calculation of the structure (without EC declaration and CE conformity marking):
 - for structures with weight and dimensions different from the defender (prototype is not tested).

ROTATION OF THE ROOF-PROTECTION

- The roof-protection can be rotated by:
 - removing two pins that block the roof-protection in drive position;
 - operating of a manual hydraulic pump;
- Then you can rotate the cabin and work on the vehicle engine.



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PROTECTION STRUCTURES FOR ROLL-OVER AND FALLING OBJECTS **ROPS – FOPS**



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