

Registration Requirements for F-4 Crash Boxes

(Reference Isatec Information for reference material on UIM website-CrashBoxDescription.pdf)

The registration requirements are split into three parts:

Part 1 Required dimensions and materials

Part 2 Requirements for dynamic drop test

Part 3 Requirements for the glueing interface between crash box and cockpit

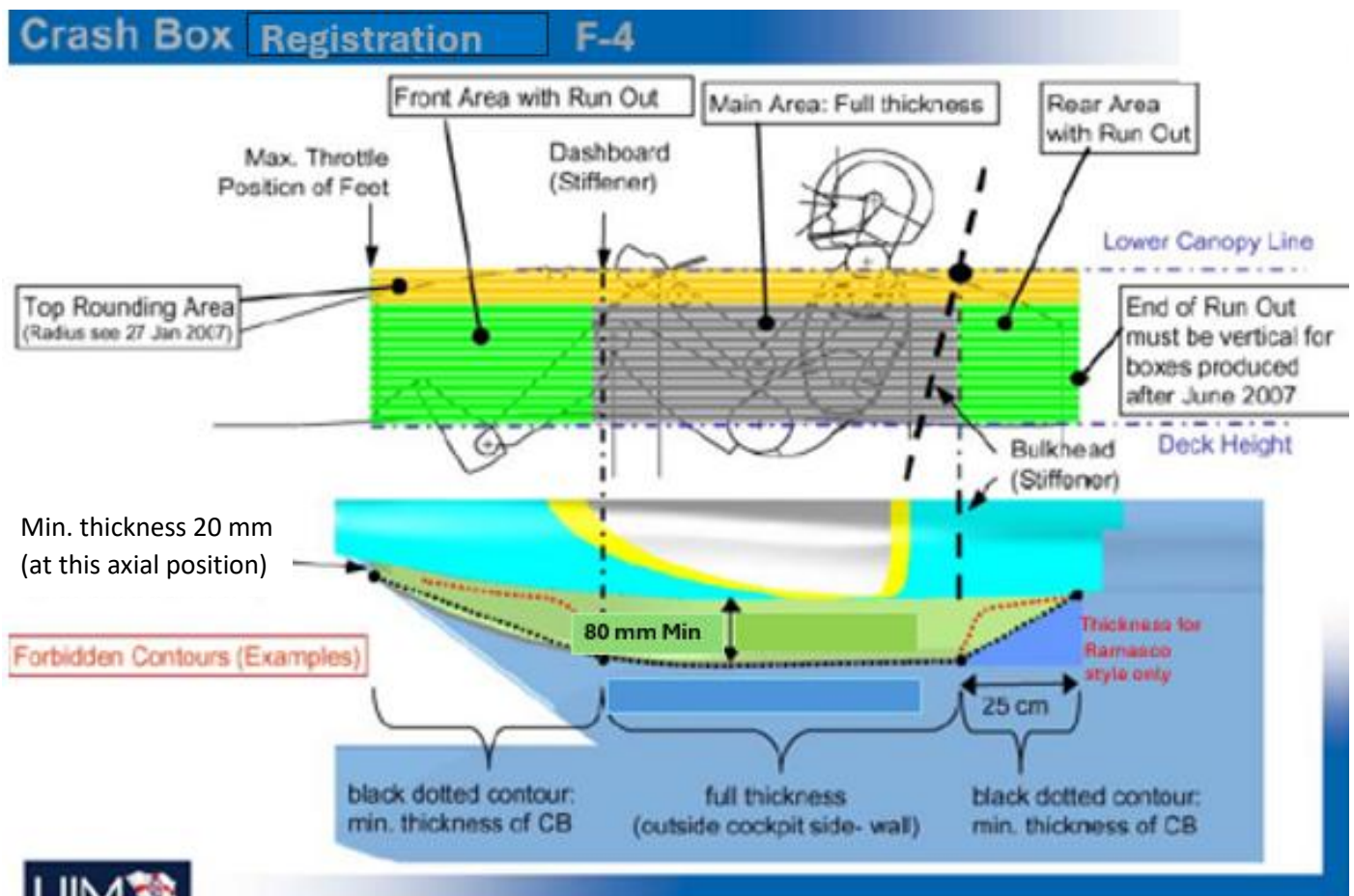
Part 1 Required dimensions of the Crash Box

- The side wall has to fulfill separately the existing requirements (rule 509 - reinforced cockpits) all over the cockpit. In additionn, the crash box must fulfill the herewith described requirements.
- The crash boxes have to be individually numbered.
- Thickness for Ramasco style only:
Minimum 80 mm
- Covered area: full thickness between the bulkhead and the dashboard with the exception of the top radius (see drawing)

The whole volume of the CB has to be filled with a layered sequence of foam and skin. No hollow areas.

Volumes are allowed within the prescribed minimum dimension of the box (black dotted line on drawing).

- At least 3 foam layers with intermediate skins in the main area. More layers are allowed. Minimum foam density is 75 kg/m^3





Part 2 Requirements for Dynamic Drop Test (in conjunction with the steel impactor)

Three square test panels are constructed to size 33 x 33 cm.

A minimum absorbed energy of 1.2 kJ during drop test as well as a maximal penetration of the box thickness + 73 mm.

Drop test with minimum 1.0 m drop to ensure the dynamic character of the test.

Part 3 Glueing

Permanent glueing all over the interface between Crash Box and cockpit is necessary for shear strength in case of an accident.

Requirements on the glue areas:

1. Border area: Min. shear strength: 2 N/mm^2
2. Inner area: Min. shear strength: 1 N/mm^2

Crash Box Registration

The documentation for approval must contain the following items:

- Design including geometry, set-up, material specification.
- Drop test results containing absorbed energy, g-time graph, force-displacement graph (and video if available)
- Shear test (as described) with photos and results
- Box ID number list, which is covered by that documentation

The documentation must be consistent and traceable concerning all requirements and has to be delivered electronically to the UIM by Politecnico di Milano. The full documentation, as described on this page, must be made for each production lot. For a new production lot with same material and production methods only manufacturing has to be documented. All further changes (e.g. additional parts for the run-out zones) have to be documented in the same way.

Disclaimer

Ramasco Yacht Design (RYD) has developed a crash box solution similar to the one used in F1 (originally designed by ISATEC), with the aim of improving the current F4 configuration.

RYD has not considered other technical aspects, which must be addressed separately to ensure a comprehensive safety improvement when installing a crash box.

These aspects may include, for example: required modifications or reinforcements to the boat's structure, the cockpit, or specific components; the influence of the crash box on aerodynamic behavior; and any other technical interactions between the crash box and the vessel.

The evaluation and management of these factors is the sole responsibility of the boat manufacturer.

RYD is exempt from any legal liability, as the data and calculations presented are theoretical in nature and should not be interpreted as final or definitive results. Furthermore, they have not been validated through FEM simulations.

Even if correctly installed, the crash box cannot guarantee the prevention of injuries or fatalities in the event of a side impact or other types of accidents.