COMPOSITE FLOOR SYSTEM.
ANALYSIS, PROJECT AND CONSTRUCTION.

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SUMMARY

The system of construction in our country is still today “the culture of concrete” inherited from the last century. Then again, it’s true that the cost of a traditional floor structure is cheaper than a floor done with the composite floor system. When we take into account other development costs the difference between both structures is less than calculated initially. However, if for the usual span lights of the composite floor system we use a traditional floor, its cost would be extraordinarily expensive. The final cost is greatly reduced when we compare the better quality obtained, adaptability and positioning in the market that this type of construction can reach.

Composite Floors are normally used only in specific situations, when more traditional solutions are not possible. One of the factors that determines this situation, besides the economic, is the almost inexistent national rules plus the lack of available information concerning these.

The main objective of this work is to compile and analyse the most important information concerning the composite floor system, exhibiting the different structural elements therein, describing the materials used with their properties and the necessary formulations for its calculation and verification.

The only regulation which contemplates this type of composite floor is the Eurocode 4: *Design of composite steel and concrete structures- Part 1-1: General rules and rules for buildings*. In this regulation are given the basis for the calculation of the composite floors, as also the conditions that these must fulfil. In order to do this, the Eurocode 4 distinguishes between two clearly different situations. The main characteristic of the first situation is the fact that the only resistant element is the steel sheeting. The second situation, when the concrete has hardened, the steel sheeting and the concrete work together, in this way we obtain a mixed section. Both situations will have to be verified under the Ultimate Limit States and Serviceability Limit States.

Part 1-2 of the same Eurocode, *General rules structural fire design*, shows the criterions to verify this type of structure under the conditions of fire; these are: thermal insulation (I), integrity (E) and resistance (R). The resistance criterion includes the necessary formulation to calculate and verify, demonstraiting that the desing bending is not greater than the ultimate moment, both under the conditions of fire.

The construction of the composite floors is important and unknown. It is necessary to have basic rules from the time of reception and storage, to the lifting, the placing of the steel decking, the framework and other secondary elements, and finalizing with the placing of the concrete and the finishing operations. Special emphasis is placed on the use of props, because an incorrect use could have disastrous results.

Using the rules given in the Eurocode 4, already stated above, a calculation has been made with a composite floor and also a traditional floor. Their results have been compared and analysed. The conclusions obtained, give us an idea concerning the planning and costs. However, even if at first, a composite floor is a little more expensive, when we take into consideration other factors, apart from just the structure, this could be beneficial in the construction of the building.

Although this document shows how to calculate and verify composite floor systems, providing ample details and verifications to be carried out, to design a project of a composite floor is relatively simple. From the spans and the permitted overload, we can obtain the required profile. All the verifications and calculations can be found resumed in tables that are provided by industrials. This fact is very positive because it helps to speed up and adapt the calculations of the project. On the other hand, any other complementary verification that we might wish to carry out, would be complicated, due to the lack of experimental information concerning composite floors.