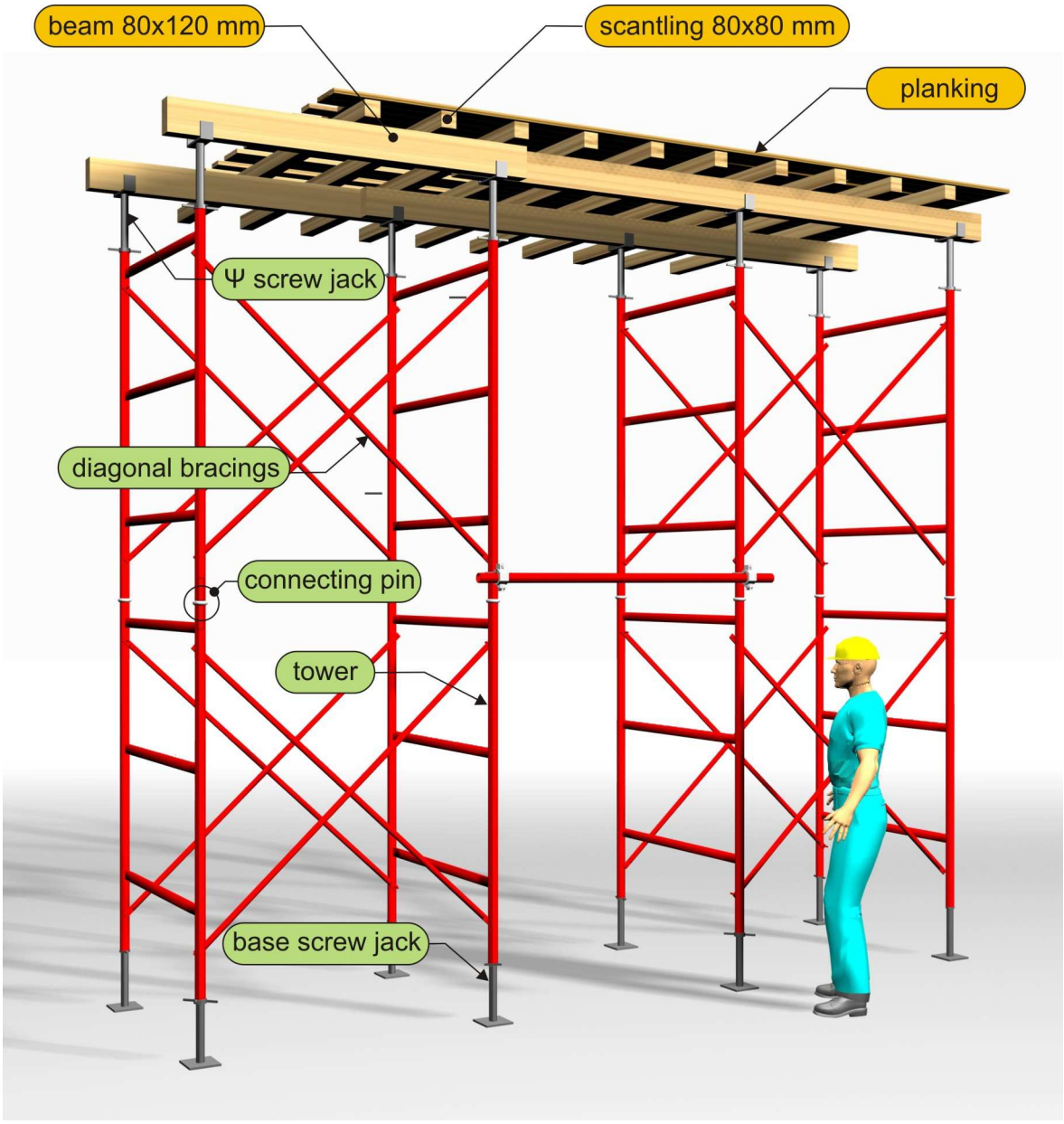
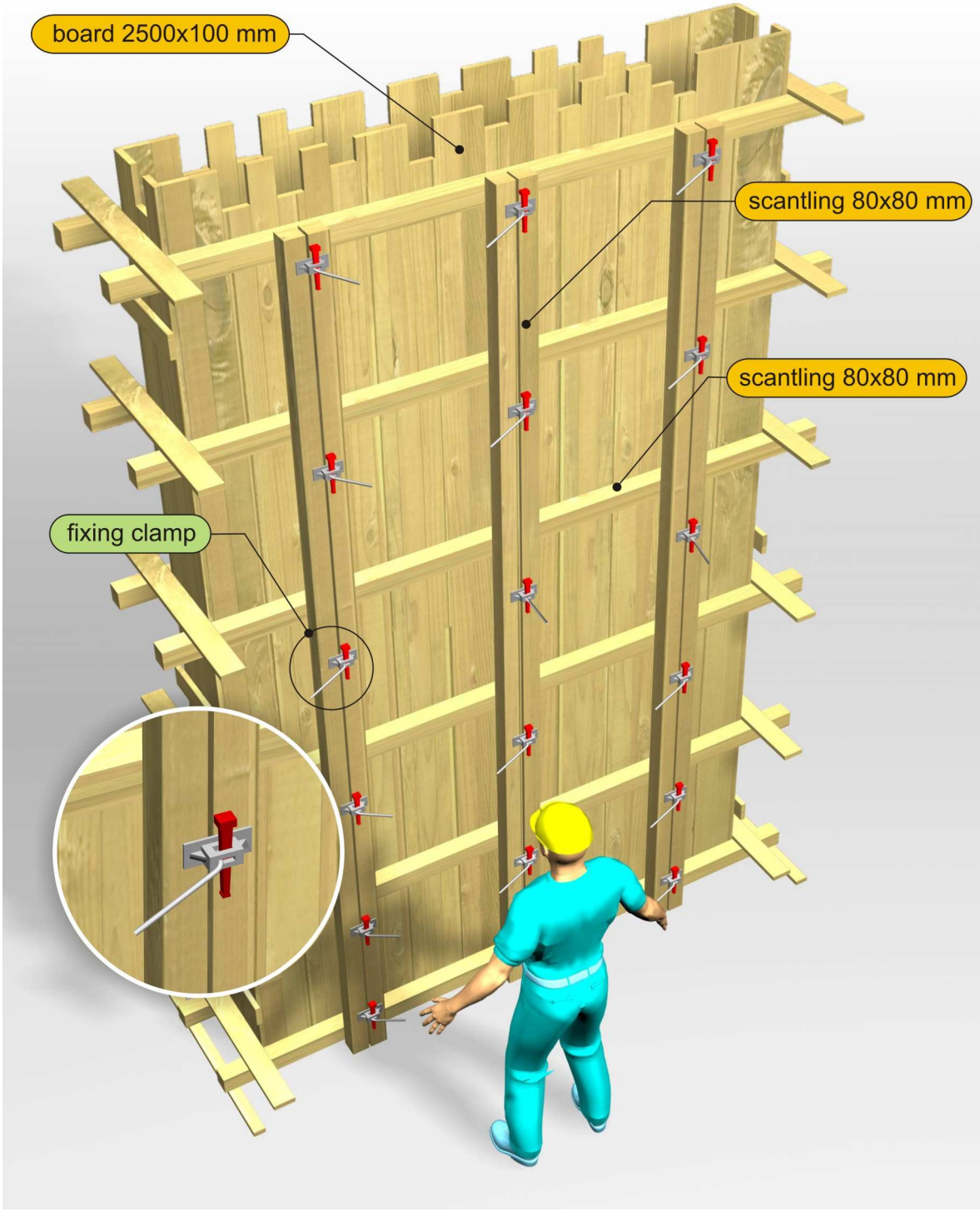
2.2 The moulds



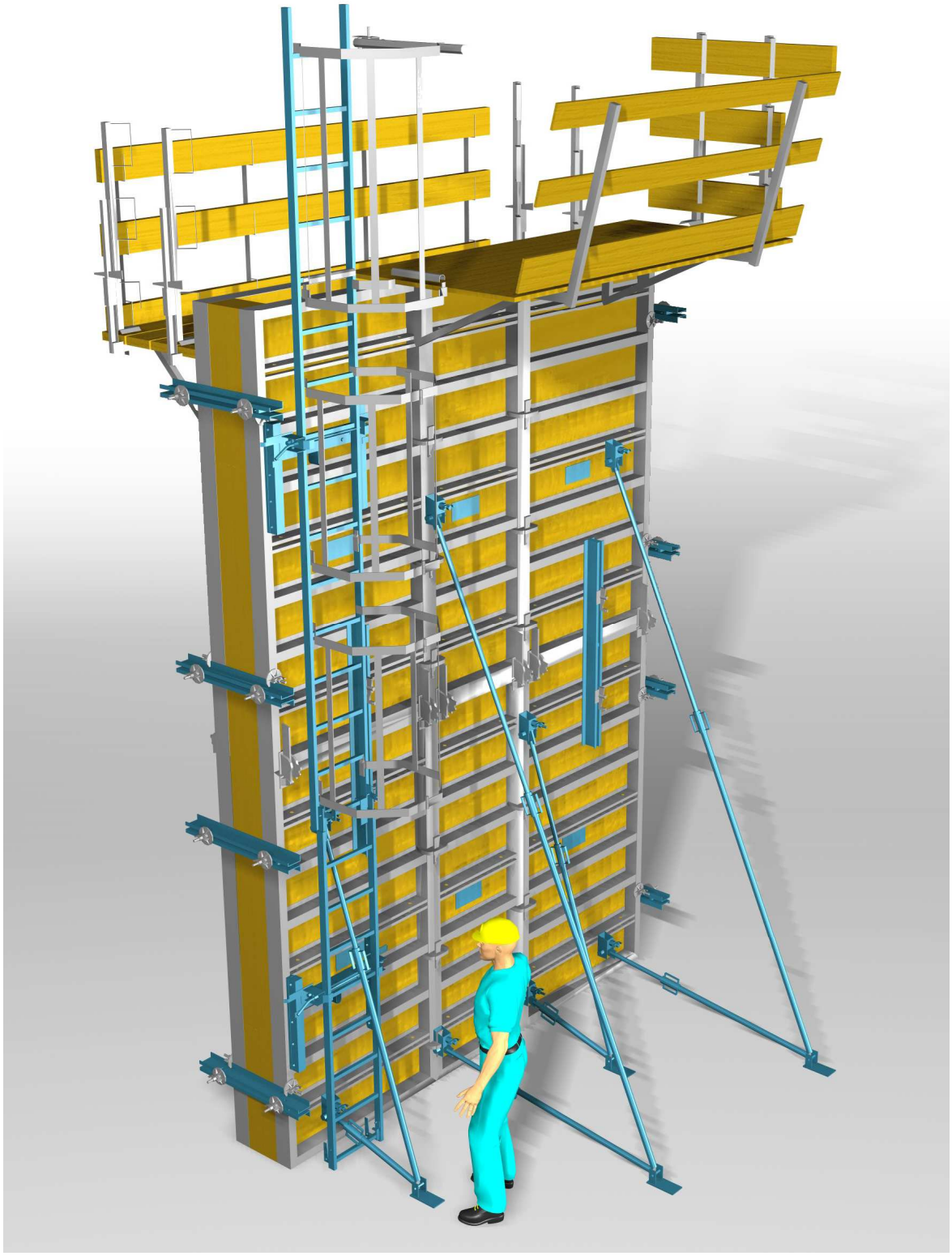
The elements of the moulds used for the formation of structural reinforced concrete members are separated in four categories:

1. Surface elements or **planking**
2. Horizontal bearing elements or **beams**
3. **Scaffolds** or staging
4. Accessories like connectors



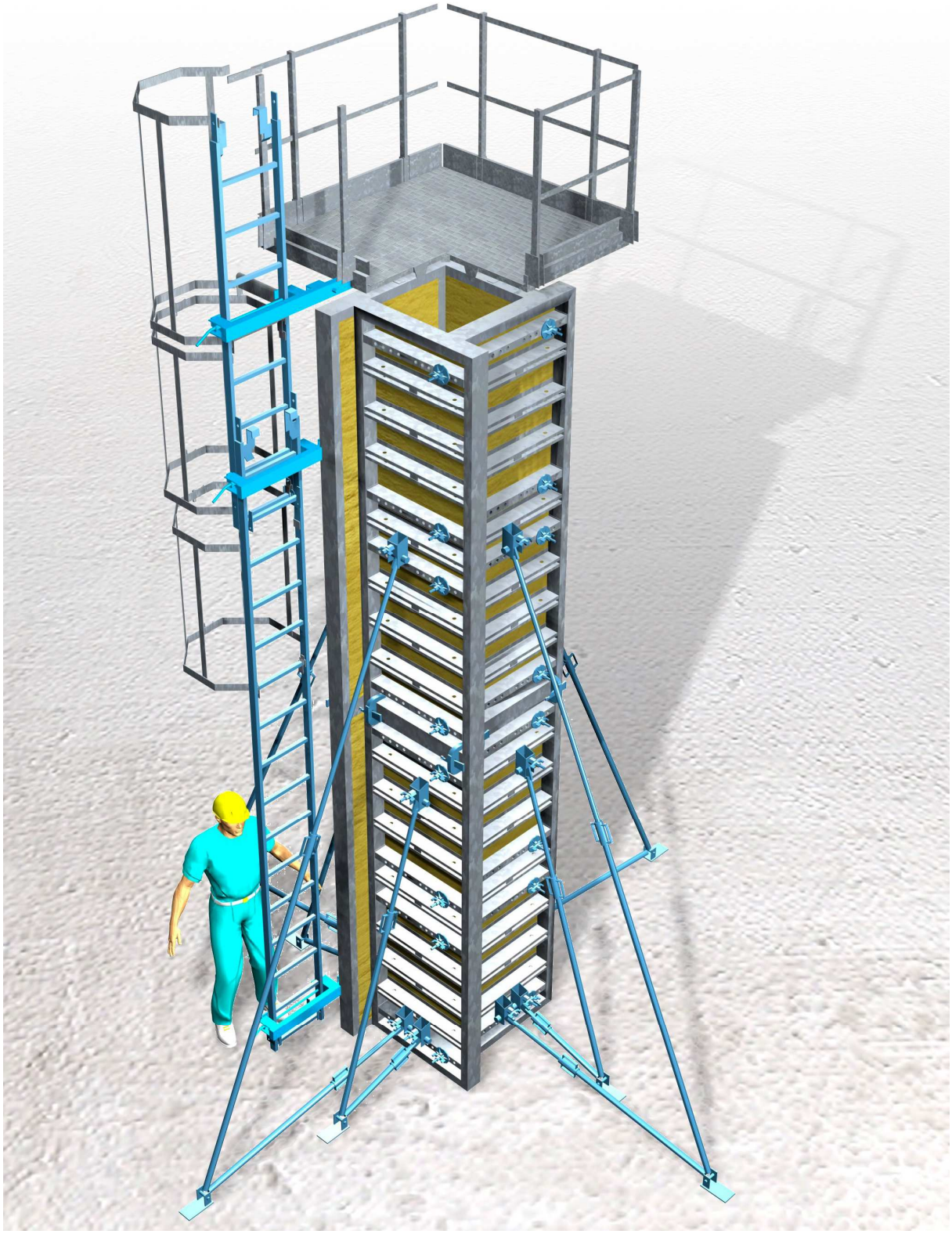
The mould elements might be conventional or industrialized. The former are mainly made out of natural timber and based on their section dimensions they are called:

- **boards** with a usual thickness of 22 mm, width ranging from 80 to 150 mm, and length varying between 2.30 and 4.50 m
- **scantling** (wooden joist) with a typical cross-section 80x80 mm and lengths ranging from 2.30 up to 4.50 m



Shear wall moulding with the use of industrial metalwork

Assembling the formwork of a 5.50 m high shear wall and positioning the working platform requires only a few minutes. Removing that formwork requires even less time and it is a fast and safe procedure.



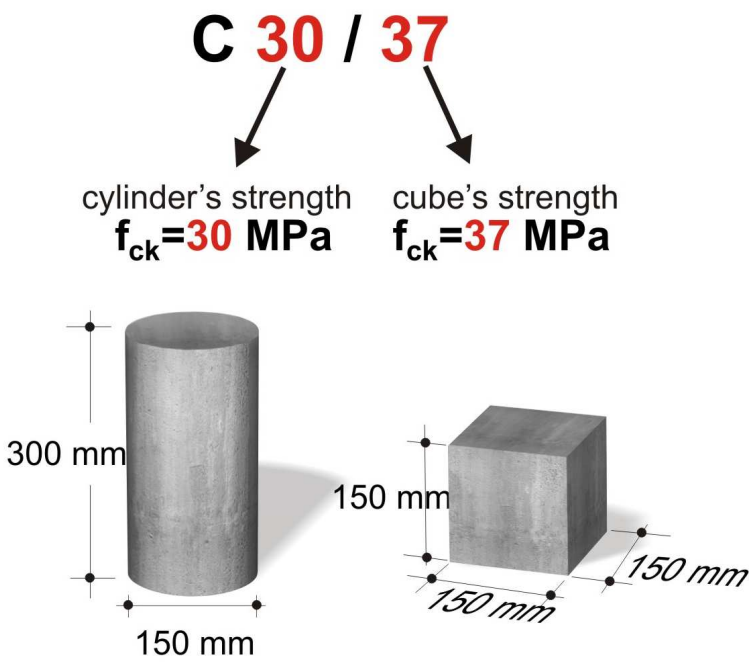
Column moulding with the use of industrial metalwork

This column is 5.50 m high and its formwork is quickly created by assembling formwork pieces with dimensions divided by 50 mm. These pieces are tied together with butterfly valves, placed in predefined positions. The formwork is temporarily supported by light-weight diagonal struts.

2.4 Concrete

2.4.1 General information

Concrete is composed by pitchers, gravels, sand, cement and water. It is created by blending these materials in measured amounts and stirring the mixture for a short period of time. The concrete's main characteristic is the fact that it hardens within a few hours from its casting; moreover it gains a large amount of strength over the initial following days. Depending upon additional properties that the concrete is required to have, special admixtures may be added during the mixing process. These may be retarding admixtures or/and super-plasticizers for improving concrete's **workability** or even steel or other composite fibers in order to increase the mixture's compressive and tensile strength.



The classification of concrete grades is based on their compressive strength. Each concrete grade (Concrete) e.g. C30/37 is characterized by two equivalent strengths, which in this specific example are 30 MPa and 37 MPa. The first is the **characteristic strength f_{ck}** of a standard concrete cylinder[4] and the latter is the characteristic strength of a standard concrete cube.

The concrete grades mentioned in Eurocode 2 and EN 206-1, are:

C12/15	C16/20	C20/25	**C25/30**	**C30/37**	**C35/45**	**C40/50**	**C45/55**	**C50/60**	C55/67	C60/75	C70/85	C80/95	C90/105
Secondary Uses				Usual Uses					Special Uses				

According to Eurocodes, the minimum suggested concrete grade is that of C30/37.

[4] This is the compressive strength used in the design

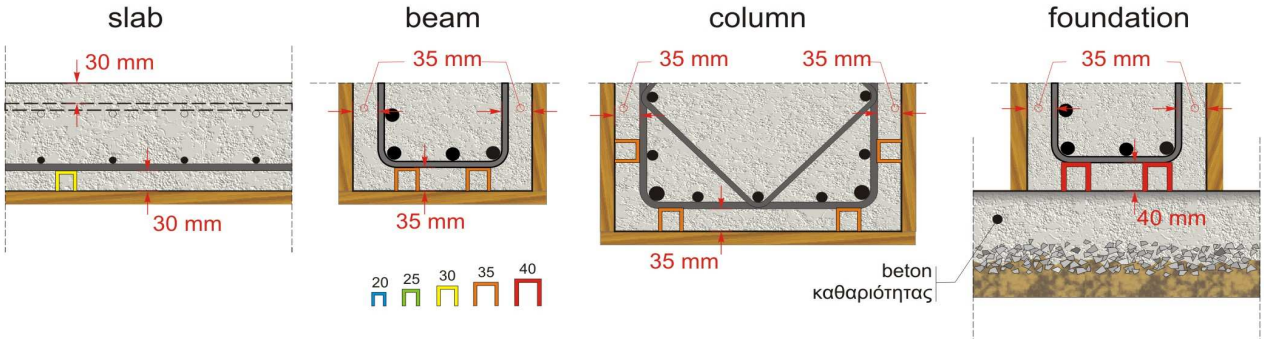
The protection of reinforcement steel against corrosion depends about its porosity and the quality and the thickness of the concrete coating. The density and quality of the concrete is achieved with the use of the suggested concrete grade. The following table demonstrates the combination of the suggested coating in conjunction to the concrete grade for the most usual environmental conditions.

	Environmental Conditions Category			
	Usual Conditions (XC2/XC3)	Extreme Conditions (XC4)	Sea side conditions (XD1/XS1)	**Pools** (XD2)
Suggested Concrete Grade	C30/37	C30/37	C30/37	C30/37
Minimum Coating	25 mm	30 mm	35 mm	40 mm
Suggested Favorable Concrete Grade	C35/45	C40/50	C40/50	C40/50
Minimum Coating	20 mm	25 mm	30 mm	35 mm

Minimum concrete coating of reinforcement steel and minimum suggested concrete grade

- In slabs 5 mm are subtracted
- In case of quality assured concrete production procedure 5 mm are subtracted m.
- In cases of a designed life span for the building of 100 years, 10 mm are added.
- In the surfaces of the footings - with cast concrete – that are in contact with the ground and there is an adequate ground formation or a footing mix layer, the minimum coatings must be ≥40 mm,. If there is no footing mix layer or ground formation, the minimum coatings must be ≥75 mm.

Example:



Construction in sea side area with a concrete grade of C30/37