

CHAPTER 2: DESIGN BASICS

2.1 GENERAL

It shall be in accordance with JSCE Standard Specification (Design), section 2.1.

2.2 DESIGN SERVICE LIFE

It shall be in accordance with JSCE Standard Specification (Design), section 2.2.

2.3 DESIGN PREREQUISITE

It is assumed for the purposes of design based on this Recommendation that construction on site will be carried out appropriately at all times.

[COMMENT]:

The basic stance relating to structural design is given here. It is assumed that construction is carried out following the intentions of the designer. Appropriate construction refers to construction carried out according to the Construction Recommendation.

2.4 DESIGN PRINCIPLES

It shall be in accordance with JSCE Standard Specification (Design), section 2.4.

2.5 CALCULATION OF SECTIONAL FORCE AND CAPACITY

It shall be in accordance with JSCE Standard Specification (Design), section 2.5.

2.6 SAFETY FACTORS

It shall be in accordance with JSCE Standard Specification (Design), section 2.6. Safety factors relating to CFRM shall be determined according to each limit state.

[COMMENT]:

Standard values for safety factors are shown in **Table C 2.6.1**, below.

Table C 2.6.1: Standard safety factors

	Material factor g_n			Member factor g_b	Structural analysis factor g_s	Load factor g_f	Structural factor g
	Concrete	CFRM	Steel				
	γ_c	g_{nf}	g_s				
Ultimate limit state	1.3* or 1.5	1.15** to 1.3	1.0 or 1.05	1.15 to 1.3	1.0	1.0 to 1.2	1.0 to 1.2
Serviceability limit state	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Fatigue limit state	1.3* or 1.5	1.15** to 1.3	1.05	1.0 to 1.1	1.0	1.0	1.0 to 1.1

* 1.3 where characteristic value of concrete compressive strength f'_{ck} is less than 50 N/mm²

** 1.15 for CFRM with carbon or Aramid fibers

2.7 CORRECTION FACTOR

It shall be in accordance with JSCE Standard Specification (Design), section 2.7.

2.8 DESIGN CALCULATIONS

It shall be in accordance with JSCE Standard Specification (Design), section 2.8.

2.9 DRAWINGS

Design drawings shall give structural and reinforcement details, showing clearly the following:

- (1) Design conditions
- (2) Details of bent portion of CFRM
- (3) Cover of reinforcing material in all parts of the structure
- (4) Locations of construction joints assumed in design
- (5) Detail drawings of zones with intertwining reinforcing materials, sheaths, anchor bolts etc.
- (6) Nominal diameter of sheaths, if used
- (7) Locations and dimensions of major chamfers

[COMMENTS]:

Design drawings should be considered the only means of transmitting the intentions of the designer to the constructor. Clear information must therefore be given regarding the conditions on which the design is based. These include the standard design strength of concrete, slump, maximum size of coarse aggregate, standards for reinforcing materials and minimum compressive strength of concrete at which prestressing may be carried out in post-tensioning prestressed concrete.

The capacity of bent portion of CFRM is generally lower than that of straight lengths, but the degree of loss depends heavily on the geometry and dimensions of the bent portion. Therefore, details of the bent portion must be given clearly. Concrete cover and concrete quality are also important factors in relation to the durability of concrete structures, and the realization of a durable concrete structure depends on these factors being examined thoroughly at the design stage. In order to transmit all of these details to the constructor, concrete cover in all parts should be clearly indicated in the design drawings.

Detail drawings of zones with intertwining reinforcing materials, sheaths, anchor bolts etc. should be prepared, and the properties of concrete at these zones be verified.