# ملاحق
# التقرير السنوي
# ٢



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أنظر الجزء الأول (١) من الملاحق

١٩٦٠

ملحق رقم ٣

# القواعد التطبيقية لاستعمال الخرسانة المسلحة
# فـــى المبانـــى

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BUILDING RESEARCH AND TRAININING CENTER

# القواعد التطبيقية لاستعمال الخرسانة المسلحة فى المبانى

# CODE OF PRACTICE

For The Use of

REINFORCED CONCRETE

IN BUILDINGS



جارى صياغتها باللغة العربية ،

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# 1 - INTRODUCTION

## 1-1 Scope :

The following code of practice covers the use of normal reinforced concrete in ordinary structures. They are intended to supplement the general provisions for materials, design and construction. Special reinforced concrete structures such as bridges and fluid containers, are to be dealt with in corresponding special codes. The design and execution of reinforced concrete work are entrusted only to qualified persons, for whom this code of practice is issued as rules and guidance.

## 1-2 Definitions :

Concrete : A suitably proportioned mixture of aggregate, cement and water.

Reinforcement: Rods, bars or fabric of structural steel, embeded in concrete for the purpose of resisting particular stresses.

Plain Concrete : Concrete without reinforcement.

Reinforced Concrete : Concrete in which reinforcement is embeded in such a manner that the two materials act together in resisting the loads.



## 1-3 Notations :

| | | |
|---|---|---|
| $A$ | : | Area |
| $A_c$ | : | Area of concrete |
| $A_s$ | : | Area of steel |
| $A_s'$ | : | Area of steel in compression side |
| $A_k$ | : | Area of core |
| $A_{st}$ | : | Area of stirrups |
| $A_{sp}$ | : | Area of spiral |

| | | |
|---|---|---|
| $A_{sb}$ | : | Area of bent bars |
| N.A. | : | Neutral axis |
| $\bar{z} = \zeta d$ | : | Depth of neutural axis from compression fibre |
| d | : | Depth of R.C. section |
| t | : | Total depth |
| b | : | Breadth of a rectangular section or web of T-section. |
| B | : | Breadth of a flange of T-or L-section. |
| $B_r$ | : | Reduced breath of a flange of T-or L-section |
| $b_s$ | : | Breadth of haunches |
| $t_s$ | : | Thickness of slab |
| e | : | Eccentricity from c.g. |
| $e_s$ | : | Eccentricity from tension steel |
| $e_s'$ | : | Eccentricity from compression steel |
| $C_c$ | : | Total compression in concrete |
| $C_s$ | : | " " in compression steel. |
| C | : | " " in section |
| T | : | " tension in steel |
| $Y_{ct} = \zeta d$ | : | Lever arm |
| d' | : | Depth of compression steel |
| $\mu$ | : | Ratio of tension steel |
| $\mu'$ | : | Ratio of compression steel |
| $\alpha$ | : | Ratio of compression steel to tension steel |
| $A_v$ | : | Area of virtual section |
| S | : | Statical moment of area |
| $S_v$ | : | " " of vertual area |
| I | : | Moment of inertia |

| | | |
|---|---|---|
| $I_v$ | : | Moment of inertia of virtual area |
| $I_{xy}$ | : | Product of inertia |
| $I_p$ | : | Polar moment of inertia |
| $E_c$ | : | Modulus of elasticity of concrete in compression |
| $E_s$ | : | Modulus of elasticity of steel |
| $E_t$ | : | Modulus of elasticity of concrete in tension |
| $E_{co}$ | : | Initial modulus of elasticity of concrete |
| $n = \frac{E_s}{E_c}$ | : | Modular ratio |
| $\nu$ | : | Poissons ratio |
| $f$ | : | Stress |
| $\xi$ | : | Strain |
| $f_c$ | : | Concrete stress in compression |
| $f_t$ | : | " " in tension |
| $f_s$ | : | Steel stress in tension |
| $f_y$ | : | Yield stress in steel |
| $f_u$ | : | Ultimate stress |
| $C_{cu}$ | : | Ultimate cube strength |
| $C_p$ | : | Prism strength |
| $\xi_u$ | : | Ultimate strain in concrete |
| $\xi_{sh}$ | : | Free shrinkage strain for concrete |
| $\xi_{cr}$ | : | Creep strain |
| $L$ | : | Effective span |
| $L_o$ | : | Clear span |
| $P$ | : | Concentrated live load |

| | | |
|---|---|---|
| $p$ | : | Distributed live load |
| $G$ | : | Concentrated dead load |
| $g$ | : | Distributed dead load |
| $W$ | : | Concentrated total load |
| $w$ | : | Distributed total load |
| $M$ | : | Bending moment |
| $Q$ | : | Shearing force |
| $N$ | : | Normal force |
| $q$ | : | Shear stress |
| $q_{st}$ | : | Shear stress taken by stirrups |
| $M_r$ | : | Moment of resistance |
| $q_b$ | : | Bond stresses |
| $\phi$ | : | Diameter of bars |
| $r$ | : | Raduis of bar |
| $M_t$ | : | Twisting moment |
| $G$ | : | Modulus of rigidity |
| $a$ | : | Shorter span of slab |
| $b$ | : | Longer span of slab |
| $w_a$ | : | Distributed total load in direction (a) of a slab |
| $w_b$ | : | Distributed total load in direction (b) " " |
| $M_a$ | : | B.M. in direction (a) |
| $M_b$ | : | " " " (b) |
| $L_b$ | : | Buckling length |
| $i$ | : | Radius of gyration |
| $\lambda = \frac{L_b}{i}$ | : | Slenderness ratio |