AMENDMENT NO. 6 APRIL 2024

TO

IS 456 : 2000 PLAIN AND REINFORCED CONCRETE — CODE OF PRACTICE

(Fourth Revision)

[*Page* 13, *clause* **5.1**, (*see also Amendment No.* 5)] — Insert the following at the end:

'm) Composite cement conforming to IS 16415 (*see* **5.1.3** below); and
n) Portland calcined clay limestone cement conforming to IS 18189 (*see* **5.1.4** below)'.

(*Page* 13, *clause* **5.1.2)** — Insert the following new clause at the end and renumber the subsequent clause:

'**5.1.3** Composite cement, conforming to IS 16415 and containing a declared clinker content not less than 45 percent, fly ash content not more than 25 percent and a minimum 28-day compressive strength of 43 MPa can be used for reinforced concrete construction.

5.1.4 At locations where temperatures are predominantly below 15 °C for 6 months, the use of Portland Calcined Clay Limestone Cement shall not be permitted in underground structures and structural elements in contact with ground water.'

[*Page* 13, *clause* **5.2**, (*see also Amendment No.* 5)] — Substitute the following for the existing paragraph under the title:

'Mineral admixtures listed below may be used along with ordinary Portland cement. Uniform blending of the mineral admixtures with the cement should be ensured.

NOTES

1 The combined use of fly ash and ground granulated blast furnace slag with ordinary Portland cement, with a minimum ordinary Portland cement content of 55 percent and maximum fly ash content of 20 percent, may be permitted.

2 Ultrafine materials, namely silica fume, metakaolin, ultrafine ground granulated blast furnace slag (as per IS 16715) may be used as additional mineral admixtures with ordinary Portland cement, Portland slag cement or Portland pozzolana cement in reinforced concrete, subject to the following:

a) In cases where fly ash is used as a mineral admixture, or Portland pozzolana cement is used, the combined content of ultrafine materials and fly ash shall not be more than 35 percent by weight of the total cementitious material. In case of concrete with W/C ratio below 0.40, additional 5 percent of ultrafine materials may be permitted.

b) In cases where ground granulated blast furnace slag is used as a mineral admixture, or Portland slag cement is used, the combined content of ultrafine materials and slag shall not be more than 60 percent by weight of the total cementitious material. In case of concrete with W/C ratio below 0.40, additional 5 percent of ultrafine materials may be permitted.

3 When ground granulated blast furnace slag alone is used as mineral admixture, the slag content shall not be more than 50 percent by weight of the total cementitious material.

4 When fly ash alone is used as mineral admixture, the fly ash content shall not be more than 35 percent by weight of the total cementitious material.

5 The slag content or fly ash content as mentioned on the bag of cement shall be considered in all above.'

[*Page* 14, *clause* **5.2.3.1**, (*see also Amendment No.* 5)] — Insert following at the end:

'Concrete containing mineral admixtures (such as fly ash and ground granulated blast furnace slag) higher than that recommended, may increase carbonation in case of reinforced concrete.'

[*Page* 15, *clause* **5.5.7**, (*see also Amendment No.* 4)] — Substitute the following for the existing:

'The amount of admixture added to a mix shall be recorded in the production record. Re-dosing of admixtures is not normally permitted. Additional dose of admixture may be added at project site and mixed adequately in mixer itself to regain the workability of concrete, if necessary, with the mutual agreement between the producer/supplier

Price Group 2

and the purchaser/user of concrete. However, the producer/supplier shall assure the ultimate quality of concrete supplied by him and maintain record of quantity and time of addition.'

(*Page* 18, *clause* **8.2.2.3**, *second sentence*) — Delete the following:

'When concrete lower than grade M 50 is used under these conditions,'

(*Page* 18, *clause* **8.2.2.3**, *informal table*) — Insert new row for 10 and 12.5, as follows:

Nominal Maximum Size Aggregate (*mm*)	*Entrained Air Percentage*
10 and 12.5	6 ± 1

(*Page* 19, *clause* **8.2.4.2**, *line* 1) — Substitute the following for the existing:

'Cement content excluding mineral admixtures such as fly ash and ground granulated blast furnace slag shall not be used in excess of 450 kg/m^3 unless special consideration has been given in design to the increased risk of cracking due to drying shrinkage in thin sections, or to early thermal cracking and to the increased risk of damage due to alkali silica reactions.'

(*Page* 19, *Table* 4, *Note* 6) — Substitute the following for the existing:

'For Class 3, Portland pozzolana cement conforming to IS 1489 (Part 1) having at least 25 percent fly ash content, and Portland slag cement conforming to IS 455 having at least 50 percent slag content give acceptable sulphate resisting properties.'

(Page 19, *Table* 4, *Note* 7) — Substitute the following for the existing:

'Where chloride is encountered along with sulphates in soil or ground water, ordinary Portland cement with C_3A content from 5 to 8 percent shall be desirable to be used in concrete, instead of sulphate resisting cement. Alternatively, Portland slag cement conforming to IS 455 having at least 50 percent slag content or a blend of ordinary Portland cement and at least 50 percent slag may be used.'

(*Page* 20, *Table* 5, *Notes*) — Insert the following at the end:

'**3** The maximum free water-cement ratio shall be reduced by 0.05 in case Portland calcined clay limestone cement as per IS 18189 is used.'

(*Page* 27, *clause* **14.2.2**, *second sentence*) — Insert the following after '0.6':

'for plain concrete and 0.5 for reinforced concrete'.

(*Page* 27, *clause* **14.2.2**, *third sentence*) — Substitute the following for the existing:

'For aggregates of 10 mm, 20 mm and 40 mm nominal maximum size, the cement content shall be at least 420 kg/m^3, 380 kg/m^3 and 350 kg/m^3 of concrete respectively.'

(*Page* 30, *clause* **17.3)** — Substitute the following for the existing:

'In case of doubt regarding the grade of concrete used, either due to poor workmanship or based on results of cube strength tests, compressive strength test of concrete on the basis of **17.4** shall be carried out. Additionally, load test (*see* **17.6**) may be carried out, where considered necessary.'

(*Page* 30, *clause* **17.5)** — Delete.

(*Page* 31, *clause* **17.8**, *third sentence*) — Delete the following:

'provide alternatives to core/cube tests for estimating the strength of concrete in a structure, or'.

[*Page* 43, *clause* **26.2.1.1**, *para* 2, *second sentence*, (*see also Amendment No.* 4)] — Substitute the following for the existing:

'For fusion bonded epoxy coated reinforcing bars conforming to IS 13620, the design bond stress values shall be taken as 80 percent of the corresponding values for deformed bars conforming to IS 1786.'

(*Page* 75, *clause* **41.3.2**) — Insert the following at the end:

'and longitudinal reinforcement shall be provided as per **41.4.2**'.

(*Page* 79, Annex A) — Insert the following at the appropriate place:

'*IS No.*	*Title*
13620 : 1993	Fusion bonded epoxy coated reinforcing bars — Specification
16415 : 2015	Composite cement — Specification
16715 : 2018	Ultrafine ground granulated blast furnace slag — Specification
18189 : 2023	Portland calcined clay limestone cement — Specification'

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