KIOCL LIMITED

Vigilance Department

VIGILANCE NEWSLETTER

APRIL 2022

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Vigilance department wishes all the employees and their families a very Happy Yugadi/Ugadi, Gudi Padwa, Vishu, Easter and Eid al-Fitr.

Continuing the effort of Vigilance Department to help the Company and its employees to stay abreast of rules and working smartly while maintaining high level of integrity, this issue of Vigilance Newsletter brings the latest circulars and notifications issued by Central Vigilance Commission, Department of Expenditure, Department of Public Enterprises having bearing on our working and vigilance.

This issue also has write-up on the fundamentals to be observed in procurement and an Article on Design mix concrete which seeks to improve our knowledge on the subject. Case studies of system improvements implemented in different CPSEs is being shared which can be emulated by KIOCL.

I expect that this edition would enhance our understanding of relevant subjects and help in our working

1st April, 2022 **Chief Vigilance Officer**

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Fundamental Principles of Public Procurement

General Financial Rules, 2017 lay down the Fundamental Principles of Public Procurement. These principles and other additional obligations of procuring authorities in public procurement can be organised into five fundamental principles of public procurement, which all procuring authorities must abide by and be accountable for:

1.0 Transparency Principle

All procuring authorities are responsible and accountable to ensure transparency, fairness, equality, competition and appeal rights. This involves simultaneous, symmetric and unrestricted dissemination of information to all likely bidders, sufficient for them to know and understand the availability of bidding opportunities and actual means, processes and time-limits prescribed for completion of enlistment of bidders, bidding, evaluation, grievance redressal, award and management of contracts. It implies that such officers must ensure that there is consistency (absence of subjectivity), predictability (absence of arbitrariness), clarity, openness (absence of secretiveness), equal opportunities (absence of discrimination) in processes. In essence Transparency Principle also enjoins upon the Procuring Authorities to do only that which it had professed to do as pre-declared in the relevant published documents and not to do anything that had not been so declared. As part of this principle, all procuring entities should ensure that offers should be invited following a fair and transparent procedure and also ensure publication of all relevant information on the Central Public Procurement Portal (CPPP);

2.0 Professionalism Principle

As per these synergic attributes, the procuring authorities have a responsibility and accountability to ensure professionalism, economy, efficiency, effectiveness and integrity in the procurement process. They must avoid wasteful, dilatory and improper practices violating the Code of integrity for Public Procurement (CIPP). They should, at the same time, ensure that the methodology adopted for procurement should not only be reasonable and appropriate for the cost and complexity but should also effectively achieve the planned objective of the procurement. As part of this principle, the government may prescribe professional standards and specify suitable training and certification requirements for officials dealing with procurement matters. In reference to the above two principles - Transparency and Professionalism Principle, It may be useful to refer to the following provisions in the General Financial Rules, 2017:

"Rule 144. Fundamental principles of public buying: Fundamental principles of public buying. (For all procurements including procurement of works). — Every authority delegated with the financial powers of procuring goods in public interest shall have the responsibility and accountability to bring efficiency, economy, and transparency in matters relating to public procurement and for fair and equitable treatment of suppliers and promotion of competition in public procurement.

The procedure to be followed in making public procurement must conform to the following yardsticks:

a) The description of the subject matter of procurement to the extent practicable should—

1. be objective, functional, generic and measurable and specify technical, qualitative and performance characteristics;

2. not indicate a requirement for a particular trade mark, trade name or brand.

b) The specifications in terms of quality, type etc., as also quantity of goods to be procured, should be clearly spelt out keeping in view the specific needs of the procuring organisations. The specifications so worked out should meet the basic needs of the organisation without including superfluous and non-essential features, which may result in unwarranted expenditure;

c) Where applicable, the technical specifications shall, to the extent practicable, be based on the national technical regulations or recognized national standards or building codes, wherever such standards exist, and in their absence, be based on the relevant international standards. In case of Government of India funded projects abroad, the technical specifications may be framed based on requirements and standards of the host beneficiary Government, where such standards exist. Provided that a procuring entity may, for reasons to be recorded in writing, adopt any other technical specification;

d) Care should also be taken to avoid purchasing quantities in excess of requirement to avoid inventory carrying costs;

e) Offers should be invited following a fair, transparent and reasonable procedure;

f) The Procuring Entity should be satisfied that the selected offer adequately meets the requirement in all respects;

g) The Procuring Entity should satisfy itself that the price of the selected offer is reasonable and consistent with the quality required;

h) At each stage of procurement, the concerned Procuring Entity must place on record, in precise terms, the considerations which weighed with it while taking the procurement decision;

i) A complete schedule of procurement cycle from date of issuing the tender to date of issuing the contract should be published when the tender is issued;

j) All Ministries/Departments shall prepare Annual Procurement Plan before the commencement of the year and the same should also be placed on their website".

3.0 Broader Obligations Principle

Over and above transparency and professionalism, the procuring authorities have also the responsibility and accountability to conduct public procurement in a manner to facilitate achievement of the broader objectives of the government - to the extent these are specifically included in the 'Procurement Guidelines':

a) Preferential procurement from backward regions, weaker sections and Micro and Small Enterprises (MSEs), locally manufactured goods or services, to the extent specifically included in the 'Procurement Guidelines'; and

b) Reservation of procurement of specified class of goods from or through certain nominated CPSEs or Government Organisations, to the extent specifically included in the 'Procurement Guidelines';

c) Support to broader social policy and programme objectives of the government (for example, economic growth, strengthening of local industry - make-in-India, Ease of Doing Business, job and employment creation, and so on, to the extent specifically included in the 'Procurement Guidelines');

d) Facilitating administrative goals of other departments of government (for example, ensuring tax or environmental compliance by participants, Energy Conservation, accessibility for People with Disabilities etc. to the extent specifically included in the 'Procurement Guidelines').

4.0 Extended Legal Responsibilities

Principle Procuring authorities must fulfil additional legal obligations in public procurement, over and above mere conformity to the mercantile laws (which even private sector procurements have to comply with). The Constitution of India has certain provisions regarding fundamental rights and public procurement. Courts have, over a time, taking a broader view of Public Procurement as a function of 'State', interpreted these to extend the responsibility and accountability of public procurement Authorities. Courts in India thus exercise additional judicial review (beyond contractual issues) over public procurement in relation to the manner of decision making in respect of fundamental rights, fair play and legality. Similarly, procuring authorities have also the responsibility and accountability to comply with the laws relating to Governance Issues like Right to Information (RTI) Act and Prevention of Corruption Act, and so on.

5.0 Public Accountability Principle

Procuring authorities are accountable for all the above principles to several statutory and official bodies in the Country – the Legislature and its Committees, Central Vigilance Commission, Comptroller and Auditor General of India, Central Bureau of Investigations and so on– in addition to administrative accountability. As a result, each individual public procurement transaction is liable to be scrutinised independently, in isolation, besides judging the overall outcomes of procurement process over a period of time. Procuring authorities thus have responsibility and accountability for compliance of rules and procedures in each individual procurement transaction besides the achievement of overall procurement outcomes. The Procuring Entity, at each stage of procurement, must therefore, place on record, in precise terms, the considerations which weighed with it while making the procurement decision from need assessment to fulfilment of need. Such records must be preserved, retained in easily retrievable form and made available to such oversight agencies. The procuring entity shall Therefore, maintain and retain audit trails, records and documents generated or received during its procurement proceedings, in chronological order, the files will be stored in an identified place and retrievable for scrutiny whenever needed without wastage of time. The documents and record will include:

a) documents pertaining to determination of need for procurement;
b) description of the subject matter of the procurement;
c) Statement of the justification for choice of a procurement method other than open competitive bidding;
d) Documents relating to pre-qualification and enlistment of bidders, if applicable;
e) Particulars of issue, receipt, opening of the bids and the participating bidders at each stage;
f) Requests for clarifications and any reply thereof including the clarifications given during pre-bid conferences;
g) Bids evaluated, and documents relating to their evaluation;
h) Contracts and Contract Amendment; and
g) Complaint handling, correspondences with Procuring Entities, consultants, banks.

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Source: Manual for Procurement of Works 2019,
Ministry of Finance, Department of Expenditure

Preventive Vigilance

Contractors' Labour Information and Management System: (CLIMS) in NTPC

1.0 Brief description of the measure/ initiative

NTPC deploys thousands of contractual workers for its various projects. To streamline the system of payment to contractors and ensuring that all statutory requirements are met, an IT based system called “Contractors' Labour Information and Management System' (CLIMS) has been implemented. It aims to streamline the processes relating to the deployment of contractual labour like proper keeping of records in a digitalized format and ensuring that the wages and other benefits of labourers deployed at NTPC Plants are disbursed correctly and in time. The CLIMS application also has inbuilt features like bio-metric attendance, medical fitness, safety training/ clearances, ESI registration, and other regulatory checks.

2.0 Background

NTPC traditionally deploys contractual workers in power-plants in Operations and Maintenance (O&M) as well as construction works. Most of the activities targeted towards payment and welfare of contractors' workers largely relied on manual records maintained by contractors. There was a lot of paper-work and physical records which had to be scrutinised carefully before the release of payments. Other Statutory compliances were also monitored manually. A need was felt to automate these processes to bring in transparency, accuracy and ensuring that workers were paid their dues in time.

3.0 Implementation

CLIMS is designed to automate several time-consuming processes in a contract involving labour force, including wage sheet processing for contractor's labour and statutory reporting and archival. The application covers the management of information of contractors and their work contracts including the contractor's labour force; their work timings, wages, welfare, safety, and health concerns. While the contractor retains ownership of labour data and enjoys full control over labour attendance, work timing, wages etc., the system provides real- time information window to concerned NTPC officers like Engineer-in-charge, HR and safety department, etc. for ensuring compliance of labour laws and labour welfare. As all the data is stored in servers, CLIMS provides on-click generation of statutory reports and faster HR clearance for contractor's payment. It has brought transparency in terms of wage payment and has ensured payment of proper wages and social security to the workers. PF & ESIC deductions are also automatically calculated in wage sheets improving accuracy and efficiency.

4.0 Impact and Benefits

	Manual System	CLIMS
1	Manual and multiple entry of data related to contract workers in various formats	One-time data entry. Same data utilised in all forms and reports.
2	Lack of worker related data and insufficient information	Creating digital data repository of workers data such as their skill level, trainings received, designation, PF/ESIC numbers, etc.
3	Tedious processes of clearances. Many times, clearances were avoided due to urgency.	Digitalization of EIC, Medical, Safety and HR clearance processes and thereby reducing paper consumption and making this process faster and effective.
4	Tedious process of gate-pass checking and access control paper gate passes can be forged	Authentication of workers using biometric machines (face recognition or finger print) to enhance security and control access to plant.
5	Problems of proxy attendance and unauthorised entry automatically.	No possibility of proxy attendance and unauthorised entry due to biometric authentication.
6	Manual attendance on registers, difficulty in collating and reporting	Availability of real-time workers' attendance data
7	No trace of workmen on the job at any given time	Live dashboard displays number of contractors' workmen deployed in each work area at any given time.
8	Manual Wage Sheet preparation	Auto-generation of Wage Sheets & Pay Roll, ensuring wage payment to workers on the last day of the month.
9	No proper validation of payments to workmen	Payments to workers are through banks and comparing bank account statements of workers with system generated wage sheets.
10	Manual preparation of MIS reports (after collecting data from various sources)	Automated, real-time reports and contextual dashboards for stakeholders, customised analytical/statistical reports and charts for Management and CLIMS users
11	Long delays in the processing of Contractors' bills and HR clearance processes	Faster HR clearance and legal compliances through the availability of authentic data online.
12	Manual preparation of statutory reports	Digitalization and automatic generation of statutory compliance reports. Manual preparation of statutory reports

CLIMS was awarded as Innovative Best Practice in Digital Transformation in the 'Service Excellence' category by the CII (Confederation of Indian Industries) in the year 2020.

CLIMS won the award of appreciation from CSI (Computer Society of India) in the year 2021.

5.0 Potential for Replicability

This application can be used by any other organization which deploys labour force for its operations, maintenance, construction or any other activities. It is replicable for other organizations with minor modifications customised to meet the specific needs of the contracts.

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Systemic Improvement

Standard Operating Procedure (SOP) as a new approach to System Improvement implemented in Central Coalfields Limited (CCL)

1.0 Brief description of the measure/Initiative Adopted Measure:

Standard Operating Procedures (SOPs) for various critical functions as a new approach to Preventive Vigilance. The SOPs were developed on the following four pillars:

a. Simplicity: Easy to comprehend & comply

b. Uniformity: Standardization of procedures

c. Accountability: Clearly defined role & responsibilities of each individual with time line

d. Vigilance Concern: Integrating Vigilance issues in SOP to make all the processes

When was it undertaken & completed: Initiated by CCL in October 2018 and completed by March 2019.

Scale of implementation: Introduced on large scale across CCL in all departments

2.0 Background

(i) It is noticed that most of the organizations were using System Improvement Suggestions (SIS) given by Vigilance Unit as the primary tools for preventive vigilance. However, complete implementation of all the SIS as suggested by Vigilance remained a challenge. It is corroborated from the fact that in CCL out of 21 SIS made during 2016 and 14 SIS in 2017, most of them could not get implemented on ground or the level of implementation was not up to the mark. When analysis of the reasons for poor implementation was done, it was found that the main reason for poor implementation of SIS lies in the fact that these SIS were prepared at HQ by the Vigilance department and sent to the field for execution with almost no consultation with field officials. Many a times the field executives/non-executives found them impractical and did not own it. Also, these System Improvements were not enforceable and no individual accountability was defined in it.

(ii) Keeping in view the above facts, it was decided to devise a new system which addresses the concerns mentioned above and which is developed with the active consultation of the officials who are responsible for its implementation. Hence, came the idea of Standard Operating Procedure (SOP) - a new approach where procedures are simplified, standardized and responsibility of all the officials at each stage is clearly defined.

(iii) Implementation (Process):

a) Developing a SOP is not a very difficult task but the challenge lies in its acceptability and practicality. Therefore, following process was adopted for developing the SOPs in critical areas of operations:
   - Consultation with the concerned GMs/HoDs on the need for developing SOPs for such subjects which have serious vigilance concerns.
   - Communication to the Area/Field Units in advance for thorough deliberation on the matter by the field officials with active involvement of Vigilance.
   - Threadbare discussion & brain storming sessions at Area/Field Units and Headquarter (HQ) by the concerned officials from field & HQ led by the respective GMs/HoDs.
   - Fine tuning and formulation of final SOP at the HQ with approval of competent authority

Hence the SOPs have been formulated in a participative and consultative manner and officials at lower level of hierarchy have also been involved so that these SOPs remain practical and acceptable.

b). In all the SOPs individual responsibility has been clearly defined at each step in such critical functional areas so as to remove any ambiguity about the role and responsibility of officials.

c). All the SOPs have been approved by the concerned competent authority. With the approval of these SOPs from the competent authorities, the provisions given in them become enforceable.

d. All the SOPs have been circulated to the Areas for implementation. Though many SOPs are in early stages of implementation, the feedback is positive. In order to monitor its effective implementation, the Nodal officers from Vigilance Dept. have been appointed to pursue the matter with the Area/ Project on specific SOPs.

(iv) To overcome the issues found in SIS, the SOPs were developed in a manner described above which is a major departure from the existing System Improvement methodology, as differentiated below:

System Improvement Suggestion (SIS)	Standard Operating Procedures (SOP)
Prepared by Vigilance department, with almost no participation from field executives	Prepared by the concerned department with full participation of field executives after several level of discussions
Not Practical - As developed by Vigilance Department with no consultation with field officials	Absolutely Practical - As developed by the officials responsible for implementation
No Ownership - Due to non-involvement of Field Officials	Complete Ownership- As the Field Officials themselves have developed this
Not Mandatory	Becomes the rule of the company & can be enforced
No Accountability	Clearly Defined Accountability – at each level
No Follow Up	Follow Ups of implementation is given in SOP itself
No Monitoring	Monitoring done by Vigilance & Management with dedicated Nodal Officers

(v) All the SOPs developed for critical functions are within the broad ambit of relevant manuals, departmental circulars, CVC guidelines, etc. Further, HoDs & concerned Directors are to ensure that the SOPs are not in conflict with any existing circulars and guidelines. For example, in the SOP for bill payment, CVC circular No 2/04/18 dated 03.05.18 for timely payment of bills has been incorporated. Similarly, SOP for estimate preparation, CVC guidelines as given in Section 9.12(i) of Vigilance Manual 2017 has been incorporated. Thus, the vigilance concerns are incorporated in the existing process as a result all the working processes have become Vigilance compliant. Hence an individual following the process defined in the SOPs automatically follows the provisions of Vigilance even if he is not aware of all latest provisions.

3.0 Impact and Benefits

1. SOP for IT initiatives: It was the first SOP which was developed in this manner. The results with respect to improvements in utilization of the instruments used have become significant. Consequent upon the implementation of IT initiatives SOP for surveillance, the results obtained were encouraging; the implementation of these items remained a major challenge to all subsidiaries of CCL:

- Monitoring of Alerts: The average number of alerts generated was more than 8000 per day almost unmanageable, this has come down to less than 50 per day & very easy to monitor and take action if required.

- Improvement in Weight Monitoring System (RFID, Boom Barrier based Weighment): Percentage Effectiveness In case of Live streaming of Weighbridge data to CCL, HQ has come up from 35% to almost 90%.
- Improvement in usage of CCTV device for Surveillance (Electronic Surveillance System – CCTV) with reference to number of CCTVs installed and CCTVs in operation.

2. SOP for Civil Engineering: Average Tendering Time for works has come down drastically from 60-90 days to 20-30 days improving the productivity of the process.

4.0 **Potential for Replicability:**

With identification of critical areas that need SOPs, its development and implementation will ensure that critical processes of the functioning of the company/organization become vigilance compliant - the ultimate goal of Preventive Vigilance. The SOPs have already been introduced in subsidiaries of Coal India Ltd. The same may be adopted by other companies after necessary modification as per their specific requirement

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Design mix concrete – Economy & Environmental issues

(Nirmal Goel, Technical Examiner, Central Vigilance Commission, N. Delhi)

1. Concrete is most commonly used material in civil construction work all over the country. There is hardly any major original civil construction work where structural concrete is not used.

2. Nowadays concrete is produced in batch mixing plants located either at site of construction or away from the site in a location from where concrete is carried in transit mixers to the site. The later one is commonly called Ready Mix Concrete (RMC).

3. The proportion of various ingredients of concrete made in batch mixing plants mentioned above is usually determined in laboratory. This process is called designing (proportioning) of concrete mix and such a concrete is called design mix concrete. The designing process is a trial and error method in which right proportion of ingredients is sought to be determined so as to achieve targeted mean strength which is kept somewhat higher than the characteristic compressive strength of the concrete. Besides achieving the targeted strength, the workability and durability requirements are also required to be ensured while designing the concrete mix. All this has to be done keeping in mind the objective of achieving overall economy by reducing the content of costliest material in the concrete, i.e. the cement.

4. The designing process in most of the major projects is usually carried out through reputed laboratories. IS 10262:2009 is the relevant Indian standard stipulating guidelines for concrete mix proportioning.

5. Some important economy and environmental issues pertaining to design mix concrete are discussed hereunder: -

   a. **Use of fly ash:**
   Fly ash is a waste product in thermal power generation. Besides occupying a large space in coal based thermal power plants, fly ash pollutes the air. Extremely fine particles of fly ash are a source of respiratory disease as these particles settle on the human lungs. Disposal of fly ash is a cause of concern from environmental consideration. Fortunately, this harmful material is a very useful material in civil construction since it has got very good pozzolanic properties and up to 35% of the cement content in concrete can be substituted with fly ash without sacrificing strength and achieving durability and economy in the construction. The quality parameters of flyash for use in concrete are laid down in IS 3812(part 1). There should be uniform blending of flyash with ordinary Portland cement. In all civil construction in the vicinity of thermal power plants, the fly ash should be used as environmental friendly measure and for economizing construction cost. While selecting concrete items at the time of preparing estimates for construction works, provision should be kept for use of fly ash along with ordinary Portland cement. The tender documents should not discourage use of fly ash in concrete as the same approach is not backed by any scientific reasoning. The use of fly ash in concrete should be promoted not only from environmental consideration but also for economizing construction cost.

   b. **Use of PPC:**
   IS Code permits use of flyash based Portland Pozzolana Cement (PPC) conforming to IS1489 (part 1) in concrete. The PPC many a times is available at lesser cost than OPC. Besides it is more environmental friendly compared to OPC since it utilizes the fly ash in its manufacturing. Use of PPC in concrete helps in environmental conservation and for economizing construction cost without sacrificing strength and achieving durability and economy in the construction.

c. Specifying high quantity of cement in tender documents:

Quantity of cement in design mix concrete depends upon several factors, chiefly on workability requirement. Workability requirement (slump values) should not, therefore, be prescribed unnecessarily high but as given in table under Para 7.1 of IS 456-2000. Further, higher workability requirement should be met by use of suitable chemical admixtures (super plasticizers / water reducing admixtures) to reduce water requirement in the concrete. The design process takes care of various factors affecting strength, durability and workability of concrete. Still there is a tendency on the part of some NIT approving authorities to stipulate much higher cement content in the concrete than specified in Table 5 of IS Code 456 given below: -

Table 5 : Minimum Cement Content, Maximum Water-Cement Ratio and Minimum Grade of Concrete for Different Exposures with Normal Weight Aggregates of 20 mm Nomination maximum Size.

Sl	Exposure	Plain Concrete			Reinforced Concrete		
		Minimum Cement Content Kg/cum	Maximum Free Water-Cement Ratio	Minimum Grade of Concrete	Minimum Cement Content Kg/cum	Maximum Free Water-Cement Ratio	Minimum Grade of Concrete
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
i)	Mild	220	0.60	-	300	0.55	M 20
ii)	Moderate	240	0.60	M 15	300	0.50	M 25
iii)	Severe	250	0.50	M 20	320	0.45	M 30
iv)	Very Severe	260	0.45	M 20	340	0.45	M 35
v)	Extreme	280	0.40	M 25	360	0.40	M 40

NOTES

1. Cement content prescribed in this table is irrespective of the grades of cement and it is inclusive of Mineral Admixtures, i.e. Pozzolanas, fly Ash, silica fume, rice husk ash, Metakaoline, Ground Granulated Blast furnace slag. The additions such as fly ash or ground granulated blast furnace slag may be taken into account in the concrete composition with respect to the cement content and water-cement ratio if the suitability is established and as long as the maximum amounts taken into account do not exceed the limit of pozzolona and slag specified in IS 1489 (Part 1) and IS 455 respectively.

Thus, the minimum cement content specified ranges from 300 to 360 kg per cum of concrete for various exposure conditions and for various grades of concretes. It is the prerogative of the designer to find out the correct quantity of cement over and above these minimum values in Table 5 of IS456. The maximum cement content in concrete in normal course is also limited to 450 kg. per cum of concrete as per Para 8.2.4.2 of IS 456. By specifying cement content much higher than the stipulation in IS 456, the entire purpose of designing is defeated. Very often designer may be easily able to achieve required targeted mean strength in lesser cement than specified in the agreement but he has to perforce specify the higher quantity given in the agreement as intimated to him by client (project authorities). Thus, the entire purpose of designing concrete in economical and environmental friendly manner is lost. Unnecessary damage to the environment is caused by emission of greenhouse gases in the environment in the process of manufacturing of wasted cement. Besides wastage / pilferage, this approach also gives rise to scope for wastage and pilferage of cement in actual execution.

d. High quantity of cement in Mix Design Report

It has also been noted that very high quantity of cement is sometimes specified in the design mix by the laboratory. The design mix report issued by the laboratory should not be directly used at site without approval of project Engineer. The Engineer should be made responsible for approval of design mix report. He should not instantly approve any design mix report which shows abnormally high cement content. In such cases, he should thoroughly check the design mix report particularly from economy angle.

He should check if the use of water reducing admixtures or plasticizers can help in reduction of water cement ratio and subsequent reduction in high quantity of cement prescribed in the design mix report particularly for higher grade of concrete where reduction in water cement ratio to value of 0.30 to 0.45 is needed. Thus, a design mix report showing very high cement content should not be readily accepted at its face value but after critical scrutiny only. The engineer should check the calculated design mix proportion by means of trial batches as per para 5 of IS10262-2009.

The author has come across a number of concrete design mix reports in various part of the country. In the opinion of author, following are the cement contents for various grades of concrete beyond which design mix report should be critically examined and rechecked: -

Grade of concrete	Cement content in kg. per cum of concrete
M 15	250 to 300
M 20	280 to 330
M 25	310 to 360
M 30	340 to 390
M 35	360 to 420
M 40	380 to 450
M 45 to M 55	400 to 450

Note: The above cement content (if OPC used) can be further reduced up to 35% by use of fly ash.

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