BIDDING DOCUMENT

for

THE PROCUREMENT OF

Supply and Laying of 150mm dia DI Pipe (Secondary Pipe) at Lalitpur Metropolitan City-02, from Heritage Garden to Kantihitti, Kalika Mandir

National Competitive Bidding (NCB)
Single-Stage: Single-Envelope Bidding Procedure

Kathmandu Upatyaka Khanepani Limited, Lalitpur Branch Office

Issued on: 2083/08/03

Issued to: All Eligible Bidders

Invitation for Bids No.: KUKL.LTR/NCB-11/083/084

NCB No.: KUKL.LTR/NCB-11/083/084

Contract Identification No.:

Abbreviations

BD .....Bidding Document

BDF .... Bidding Forms

BDS ..... . Bid Data Sheet

BOQ ..... . Bill of Quantities

COF ..... . Contract Forms

DP ... . Development Partners

DoLI..... Department of Local Infrastructure

e-GP……. Electronic Government Procurement

ELI ... . Eligibility

EEC..... . Evaluation and Eligibility Criteria

GCC ... . General Conditions of Contract

GoN[1] ... . Government of Nepal

ICC ..... . International Chamber of Commerce

IFB ……. Invitation for Bids

ITB ..... . Instructions to Bidders

JV ... . Joint Venture

NCB ... . National Competitive Bidding

NRs..... Nepalese Rupees

PAN ... . Permanent Account Number

PPA ... . Public Procurement Act, 2063

PPMO ... . Public Procurement Monitoring Office

PPR ... . Public Procurement Regulations, 2064

PS ……... Provisional Sum

SBD .... Standard Bidding Document

SCC .... Special Conditions of Contract

TS .....Technical Specifications

VAT ... . Value Added Tax

WRQ ... . Works Requirements

[1] "GoN" word indicates all public entities according to Public Procurement Act, 2063

Table of Contents

Invitation for Bids 1

Part - I Bidding Procedures

Section - I Instructions to Bidders ... …….3
Section - II Bid Data Sheet……...…….24
Section - III Evaluation and Eligibility Criteria……..……..…….30
Section – IV Bidding Forms……..……....33

Part - II Requirements 44

Section - V Works Requirements …….…….46
Section - VI Bill of Quantities……. …...….52

Part - III Conditions of Contract and Contract Forms 57

Section - VII General Conditions of Contract……..…61
Section - VIII Special Conditions of Contract……..…....92
Section - IX Contract Forms ……..97

Invitation for Bids

[Government of Nepal/or other public entity if applicable]

Kathmandu Upatyaka Khanepani Limited, Lalitpur Branch Office

Invitation for Bids No: KUKL.LTR/NCB-11/083/084

Date of publication: 2083/08/03

1. **Kathmandu Upatyaka Khanepani Limited, Lalitpur Branch Office** invites sealed bids or electronic bids from Nepalese eligible bidders for the construction of ***Supply and Laying of 150mm dia DI Pipe (Secondary Pipe) at Lalitpur Metropolitan City-02, from Heritage Garden to Kantihitti, Kalika Mandir*** under National Competitive Bidding procedures. The estimated amount for the works is NRs. 58,00,121.95 *(without VAT & Contingency but including PS).*

2. Eligible Bidders may obtain further information and inspect the Bidding Documents at the office of ***Kathmandu Upatyaka Khanepani Limited, Lalitpur Branch Office, Jawalakhel Lalitpur. E-mail: lalitpur@kukl.org.np contact no. : 015-916240*** or may visit PPMO website www.bolpatra.gov.np/egp.

3. A complete set of Bidding Documents may be purchased from the office ***Kathmandu Upatyaka Khanepani Limited, Lalitpur Branch Office, Jawalakhel Lalitpur*** and the office ***[insert name and address]*** by eligible Bidders on the submission of a written application, along with the copy of company/firm registration certificate, and upon payment of a non-refundable fee of ***Rs.3000*** till ***2083/08/23 before 12:00 PM*** during office hours in the account as specified below.

   Name of the Bank: Everest Bank Ltd., Pulchowk Branch

   Name of Office: Kathmandu Upatyaka Khanepani Limited, Lalitpur Branch Office

   Account no.: 01200105200018

   Office Code no. :……..

   Rajaswa (revenue) Shirshak no. :

   Or

   Bidders who choose to submit their bid electronically may download the bidding documents for e-submission from PPMO's e-GP system www.bolpatra.gov.np/egp at no cost.

4. Pre-bid meeting shall be held at ***Kathmandu Upatyaka Khanepani Limited, Lalitpur Branch Office, Jawalakhel Lalitpur*** at ***2:00 PM 2083/08/15***

5. Sealed or Electronic bids must be submitted to the office ***[Insert Name and address]*** by hand/courier or through PPMO website www.bolpatra.gov.np/egpon or before ***12:00 PM*** on ***2083/08/23.*** Bids received after this deadline will be rejected.

6. The bids will be opened in the presence of Bidders' representatives who choose to attend at ***after 1:00 PM on 2083/08/23*** at the office of ***Kathmandu Upatyaka Khanepani Limited, Lalitpur Branch Office, Jawalakhel Lalitpur.*** Bids must be valid for a period of ***90 days*** from the bid submission deadline and must be accompanied by a bid security or scanned copy of the bid security in .pdf format in case of e-bid, amounting to a minimum of ***Rs. 1,46,000.00 (Rupees One Lakh Forty-Six Thousand Only.)***, which shall be valid for 30 days beyond the validity period of the bid.

7. If the last date of purchasing and /or submission falls on a government holiday, then the next working day shall be considered as the last date. In such case the validity period of the bid and bid security shall remain the same as specified for the original last date of bid submission.

Part - I Bidding Procedures

Table of Clauses

Section-I Instruction to Bidders……3

A. General ……..... 3
1. Scope of Bid 3
2. Source of Funds 3
3. Fraud and Corruption 3
4. Eligible Bidders 6
5. Eligible Materials, Equipment and Services 8
B. Contents of Bidding Document 8
6. Sections of Bidding Document 8
7. Clarification of Bidding Document, Site Visit, Pre-Bid Meeting 9
8. Amendment of Bidding Document 10
C. Preparation of Bids 10
9. Cost of Bidding 10
10. Language of Bid 10
11. Documents Comprising the Bid 10
12. Letter of Bid and Schedules 11
13. Bid Prices and Discounts 11
14. Currency of Bid and Payment 11
15. Period of Validity of Bids 12
16. Bid Security 12
17. Format and Signing of Bid ……..... 14
D. Submission and Opening of Bids ……..... 14
18. Sealing and Marking of Bids 14
19. Deadline for Submission of Bids 14
20. Late Bids 14
21. Withdrawal and Modification of Bids 15
22. Bid Opening 16
E. Evaluation and Comparison of Bids 17
23. Confidentiality 17
24. Clarification of Bids 17
25. Deviations, Reservations, and Omissions 17
26. Determination of Responsiveness 17
27. Nonconformities, Errors, and Omissions 18
28. Correction of Arithmetical Errors 19
29. Evaluation of Bids 19
30. Comparison of Bids 20
31. Employer's Right to Accept Any Bid, and to Reject Any or All Bids..... ... 21
F. Award of Contract ..... …. 21
32. Award Criteria 21
33. Letter of Intent to Award the Contract/ Notification of Award 21
34. Performance Security 22
35. Signing of Contract 22
36. Complaint and Review 22

SECTION– I: Instructions to Bidders

This section specifies the procedures to be followed by Bidders in the preparation and submission of their Bids. Information is also provided on the submission, opening, and evaluation of bids and on the award of contract.

A. General	
1. Scope of Bid	1.1 In connection with the Invitation for Bids indicated in the **Bid Data Sheet (BDS)**, the Employer, as indicated **in the BDS**, issues this Bidding Document for the procurement of Works as specified in Section V (Works Requirements). The name, identification, and number of lots (Contracts) / multiple contracts of the National Competitive Bidding (NCB) are provided **in the BDS.**
	1.2 Throughout this Bidding Document: (a) the term "in writing" means communicated in written form and delivered against receipt through e-GP system or e-mail or fax or courier; (b) except where the context requires otherwise, words indicating the singular also include the plural and words indicating the plural also include the singular; and (c) "day" means calendar day.
2. Source of Funds	2.1 GoN Funded: In accordance with its annual program and budget, approved by the GoN, the implementing agency indicated **in the BDS** plans to apply a portion of the allocated budget to eligible payments under the contract(s) for which this Bidding Document is issued. Or Public Entities' own Resource Funded: In accordance with its annual program and budget, approved by the public entity, the implementing agency indicated **in the BDS** plans to apply a portion of the allocated budget to eligible payments under the contract(s) for which this Bidding Document is issued. Or DP Funded: The GoN has applied for or received financing (hereinafter called "funds") from the Development Partner (hereinafter called "the DP") indicated **in the BDS** toward the cost of the project named in the BDS. The GoN intends to apply a portion of the funds to eligible payments under the contract(s) for which this Bidding Document is issued.
	2.2 DP Funded: Payment by the DP will be made only at the request of the GoN and upon approval by the DP in accordance with the terms and conditions of the financing agreement between the GoN and the DP (hereinafter called the "Loan/Grant Agreement"), and will be subject in all respects to the terms and conditions of that Loan/Grant Agreement. No party other than the GoN shall derive any rights from the Loan Agreement or have any claim to the funds.
3. Fraud and Corruption	3.1 Procuring Entities as well as bidders, suppliers and contractors and their sub-contractors under GoN/DP-financed contracts, shall adhere to the highest standard of ethics during the procurement and execution of such contracts. In pursuance of this; (a) the Employer adopts, for the purposes of this provision, the terms as

	defined below: (i) "Corrupt practice" means the offering, giving, receiving, or soliciting, directly or indirectly, anything of value to influence improperly the actions of another party; (ii) "Fraudulent practice" means any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation; (iii) "Coercive practice" means impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party; (iv) "collusive practice" means an arrangement between two or more parties designed to achieve an improper purpose, including influencing improperly the actions of another party. (v) "obstructive practice" means (a) deliberately destroying, falsifying, altering, or concealing of evidence material to an investigation; (b) making false statements to investigators in order to materially impede an investigation; (c) failing to comply with requests to provide information, documents, or records in connection with an investigation; (d) threatening, harassing, or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation; or (e) materially impeding GoN/DP's contractual rights of audit or access to information; and (vi) "integrity violation" is any act which violates Anticorruption Policy, including (i) to (v) above and the following: abuse, conflict of interest, violations of GoN/DP sanctions, retaliation against whistleblowers or witnesses, and other violations of Anticorruption Policy, including failure to adhere to the highest ethical standard. (b) the Employer will reject a proposal for award if it determines that the Bidder recommended for award has, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices or other integrity violations in competing for the contract; (c) DP will cancel the portion of the financing allocated to a contract if it determines at any time that representative(s) of the GoN or of a beneficiary of DP-financing engaged in corrupt, fraudulent, collusive, or coercive practices or other integrity violations during the procurement or the execution of that contract, without the GoN having taken timely and appropriate action satisfactory to DP to remedy the situation. (d) DP will impose remedial actions on a firm or an individual, at any time, in accordance with DP's Anticorruption Policy and related Guidelines (as amended from time to time), including declaring ineligible, either indefinitely or for a stated period of time, to participate in DP-financed, -administered, or -supported activities or to benefit from an DP-financed, -administered, or -supported contract, financially or otherwise, if it at any time determines that the firm or individual has, directly or through

	an agent, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices or other integrity violations; and (e) The Contractor shall permit the GoN/DP to inspect the Contractor's accounts and records relating to the performance of the Contractor and to have them audited by auditors appointed by the GoN/DP, if so required by the GoN/DP.
	3.2 The Bidder shall not carry out or cause to carry out the following acts with an intention to influence the implementation of the procurement process or the procurement agreement: (a) give or propose improper inducement directly or indirectly, (b) distortion or misrepresentation of facts, (c) engaging in corrupt or fraudulent practice or involving in such act, (d) interference in participation of other competing bidders, (e) coercion or threatening directly or indirectly to cause harm to the person or the property of any person to be involved in the procurement proceedings, (f) collusive practice among bidders before or after submission of bids for distribution of works among bidders or fixing artificial/uncompetitive bid price with an intention to deprive the Employer the benefit of open competitive bid price, (g) contacting the Employer with an intention to influence the Employer with regards to the bids or interference of any kind in examination and evaluation of the bids during the period from the time of opening of the bids until the notification of award of contract.
	3.3 PPMO, on the recommendation of the Procuring Entity may blacklist a Bidder for a period of one (1) to three (3) years for its conduct including on the following grounds and seriousness of the act committed by the bidder: (a) if convicted by a court of law in a criminal offence which disqualifies the Bidder from participating in the contract, (b) if it is established that the contract agreement signed by the Bidder was based on false or misrepresentation of Bidder's qualification information, (c) if it at any time determines that the firm has, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices in competing for, or in executing, a GoN/DP-financed contract. (d) if the successful bidder fails to sign the contract. (e) if the bidder fails to inform or informs after the specified time about the saturation of the maximum number of contracts as per ITB 4.9. (f) a Bidder requests for withdrawal or modification of its bid: (i) after the Bid Submission deadline and during the period of validity specified by the Bidder on the Letter of Bid, in case of electronic submission; (ii) from the period twenty-four hours prior to bid submission deadline up to the period of bid validity specified by the Bidder on the Letter of Bid, in case of hard copy submission. (g) if the bidder does not provide clarifications of its Bid by the date and time set in the Employer's request for clarification pursuant to ITB 24.1.

	(h) a Bidder changes the prices or substance of the bid while providing information pursuant to ITB 24.1.
	3.4 A bidder declared blacklisted and ineligible by the GoN, Public Procurement Monitoring Office (PPMO), by a competent authority under the prevailing law for failure to repay a loan disbursed by a bank or financial institution, and/or the DP in case of DP funded project, shall be ineligible to bid for a contract during the period of time determined by the GoN, PPMO, the competent authority and/or the DP. 3.5 In case of a natural person or firm/institution/company which is already declared blacklisted and ineligible by the GoN, any other new or existing firm/institution/company owned partially or fully by such Natural person or Owner or Board of director of blacklisted firm/institution/company; shall not be eligible bidder.
	3.6 Furthermore, Bidders shall be aware of the provisions of GCC 28.3 and GCC 72.3(j).
4. Eligible Bidders	4.1 A Bidder may be a natural person, private entity, or government- owned entity—subject to ITB 4.5—or any combination of them in the form of a Joint Venture (JV) under an existing agreement, or with the intent to constitute a legally-enforceable joint venture. In the case of a JV: (a) all partners shall be jointly and severally liable for the execution of the Contract in accordance with the Contract terms. Maximum number of JV shall be as specified **in the BDS**. The eligibility criteria requirement of the parties to the JV shall be as specified in Section III Evaluation and Eligibility Criteria, and (b) the JV shall nominate a Representative who shall have the authority to conduct all business for and on behalf of any and all the parties of the JV during the bidding process and, in the event the JV is awarded the Contract, during Contract execution.
	4.2 A Bidder, and all parties constituting the Bidder, shall have the nationality of any country or eligible countries mentioned **in the BDS**. A Bidder shall be deemed to have the nationality of a country if the Bidder is a citizen or is constituted, or incorporated, and operates in conformity with the provisions of the laws of that country. This criterion shall also apply to the determination of the nationality of proposed sub-Contractors or suppliers for any part of the Contract including related services.
	4.3 A Bidder shall not have a conflict of interest. A Bidder found to have a conflict of interest shall be disqualified. if any of, including but not limited to, the following apply: (a) they have controlling partners in common; or (b) they receive or have received any direct or indirect subsidy from any of them; or (c) they have the same legal representative for purposes of this bid; or (d) they have a relationship with each other, directly or through common third parties, that puts them in a position to have access to information about or improper influence on the Bid of another Bidder, or influence the

	decisions of the Employer regarding this bidding process; or (e) a Bidder participates in more than one bid in this bidding process either individually or as a partner in a joint venture. This will result in the disqualification of all Bids in which it is involved. However, subject to any finding of a conflict of interest in terms of ITB 4.3 (a)-(d) above, this does not limit the participation of the same subcontractor in more than one bid; or (f) a Bidder or any of its affiliated entities, participated as a consultant in the preparation of the design or technical specifications of the works that are the subject of the Bid; or (g) a Bidder was affiliated with a firm or entity that has been hired (or is proposed to be hired) by the Employer as Engineer for the Contract. or (h) a Bidder that has a close business or family relationship with a professional staff of the Procuring Entity.
	4.4 A firm that is under a declaration of ineligibility by the GoN/DP in accordance with ITB 3, at the date of the deadline for bid submission or thereafter, shall be disqualified. A firm shall not be eligible to participate in any procurement activities under an DP-financed, -administered, or -supported project while under temporary suspension or debarment by DP pursuant to the DP's Anticorruption Policy (see ITB 3), whether such debarment was directly imposed by the DP, or enforced by other DPs pursuant to the Agreement for Mutual Enforcement of Debarment Decisions. A bid from a temporary suspended or debarred firm will be rejected.
	4.5 Enterprises owned by Government shall be eligible only if they can establish that they are legally and financially autonomous and operate under commercial law, and that they are not a dependent agency of the GoN.
	4.6 Bidders shall provide such evidence of their continued eligibility satisfactorily to the Employer, as the Employer shall reasonably request.
	4.7 Firms shall be excluded in any of the cases, if (a) by an act of compliance with a decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations, Nepal prohibits any import of goods or contracting of works or services from that country or any payments to persons or entities in that country. (b) DP Funded: as a matter of law or official regulation, Nepal prohibits commercial relations with that country, provided that the DP is satisfied that such exclusion does not preclude effective competition for the supply of goods or related services required; (c) DP Funded: a firm has been determined to be ineligible by the DP in relation to their guidelines or appropriate provisions on preventing and combating fraud and corruption in projects financed by them.
	4.8 The Bidder, including all parties constituting the Bidder, shall be ineligible to participate in the open competitive bidding process if it has already secured maximum number of construction contracts (in open competitive bidding) **as specified in BDS** and has not yet completed the work as stipulated in the respective contracts.

	4.9 For the purpose of ITB 4.8 above, the bidder shall declare that the bidder, and all parties constituting the Bidder have not already secured maximum number of construction contracts (in open competitive bidding in procurement of works) **as specified in BDS**. If the bidder, and all parties constituting the Bidder has participated in bidding processes of many public entities and during that period the maximum number of contracts have been attained as specified saturates due to issuance of letters of acceptance by a particular public entity, the bidder shall inform in writing to all other concerned public entities, where the bidder have participated in bidding process, within three days of issuance of last letter of acceptance that saturates the maximum number of contracts as specified.
5. Eligible Materials, Equipment and Services	5.1 The materials, equipment and services to be supplied under the Contract shall have their origin in any source countries as defined in **the BDS** and all expenditures under the Contract will be limited to such materials, equipment, and services. At the Employer's request, Bidders may be required to provide evidence of the origin of materials, equipment and services.
	5.2 For purposes of ITB 5.1 above, "origin" means the place where the materials and equipment are mined, grown, produced or manufactured, and from which the services are provided. Materials and equipment are produced when, through manufacturing, processing, or substantial or major assembling of components, a commercially recognized product results that differ substantially in its basic characteristics or in purpose or utility from its components.
B. Contents of Bidding Documents	
6. Sections of Bidding Document	6.1 The Bidding Document consist of Parts I, II, and III, which include all the Sections indicated below, and should be read in conjunction with any Addenda issued in accordance with ITB 8. PART I Bidding Procedures Section I Instructions to Bidders (ITB) Section II Bid Data Sheet (BDS) Section III Evaluation and Eligibility Criteria (EEC) Section IV Bidding Forms (BDF) PART II Requirements Section V Works Requirements (WRQ) Section VI Bill of Quantities (BOQ) PART III Conditions of Contract and Contract Forms Section VII General Conditions of Contract (GCC) Section VIII Special Conditions of Contract (SCC) Section IX Contract Forms (COF)
	6.2 The Invitation for Bids (IFB) issued by the Employer is not part of the Bidding Document.
	6.3 The Employer is not responsible for the completeness of the Bidding Document and their Addenda, if they were not obtained directly from the source stated by the Employer in the Invitation for Bids.
	6.4 The Bidder is expected to examine all instructions, forms, terms, and

	specifications in the Bidding Document and to furnish with its bid all information and documentation as is required by the Bidding Documents. Failure to furnish all information or documentation required by the Bidding Document may result in the rejection of the bid.
7. Clarification of Bidding Document, Site Visit, Pre-Bid Meeting	7.1 A prospective Bidder requiring any clarification of the Bidding Document shall contact the Employer by writing at the Employer's address indicated **in the BDS** or raise any question or curiosity during the pre-bid meeting if provided for in accordance with ITB 7.4. The Employer will respond in writing to any request for clarification, provided that such request is received within the period as mentioned in ITB 7.5. The Employer shall forward copies of its response to all Bidders who have acquired the Bidding Document in accordance with ITB 6.3, including description of the inquiry but without identifying its source. Should the Employer deem it necessary to amend the Bidding Document as a result of a request for clarification, it shall do so following the procedure under ITB 8 and ITB 17.2
	7.2 The Bidder is advised to visit and examine the Site of Works and its surroundings and obtain for itself, on its own risk and responsibility, all information that may be necessary for preparing the bid and entering into a Contract for construction of the Works. The costs of visiting the Site shall be at the Bidder's own expense.
	7.3 The Bidder and any of its personnel or agents will be granted permission by the Employer to enter upon its premises and lands for the purpose of such visit, but only upon the express condition that the Bidder, its personnel, and agents will release and indemnify the Employer and its personnel and agents from and against all liability in respect thereof, and will be responsible for death or personal injury, loss of or damage to property, and any other loss, damage, costs, and expenses incurred as a result of the inspection.
	7.4 The Bidder's designated representative is invited to attend a pre-bid meeting, if provided for **in the BDS.** The purpose of the meeting will be to clarify issues and to answer questions on any matter that may be raised at that stage. 7.5 The Bidder is requested, as far as possible, to submit any questions in writing, to reach the Employer as mentioned **in BDS**.
	7.5 The Bidder is requested, to submit any questions in writing, to reach the Employer as mentioned **in BDS**.
	7.6 Minutes of the pre-bid meeting, including the text of the questions raised, without identifying the source, and the responses given, together with any responses prepared after the meeting, will be transmitted promptly to all Bidders who have acquired the Bidding Document in accordance with ITB 6.3. Any modification to the Bidding Document that may become necessary as a result of the pre-bid meeting shall be made by the Employer exclusively through the issue of an addendum pursuant to ITB 8 and not through the minutes of the pre-bid meeting.
	7.7 Nonattendance at the pre-bid meeting will not be a cause for disqualification of a Bidder.
8. Amendment of Bidding Document	8.1 At any time prior to the deadline for submission of bids, the Employer may amend the Bidding Document by issuing addendum or several addenda.
	8.2 Any addendum issued shall be part of the Bidding Document and shall be

	communicated in writing to all who have obtained the Bidding Document from the Employer in accordance with ITB 6.3.
	8.3 To give prospective Bidders reasonable time in which to take an addendum into account in preparing their bids, the Employer may, at its discretion, extend the deadline for the submission of bids, pursuant to ITB 19.2. However, the time available to submit bids shall not be less than five (5) days since amendment in bidding document.
C. Preparation of Bids	
9. Cost of Bidding	9.1 The Bidder shall bear all costs associated with the preparation and submission of its Bid, and the Employer shall in no case be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.
10. Language of Bid	10.1 The Bid, as well as all correspondence and documents relating to the bid exchanged by the Bidder and the Employer, shall be written in the language specified **in the BDS**. Supporting documents and printed literature that are part of the Bid may be in another language provided they are accompanied by an accurate translation of the relevant passages in the language specified **in the BDS**, in which case, for purposes of interpretation of the Bid, such translation shall govern.
11. Documents Comprising the Bid	11.1 The Bid shall comprise the following: (a) Letter of Bid; (b) completed Bill of Quantities (BoQ), in accordance with ITB 12 and ITB 13, or as stipulated **in the BDS**; (c) Bid Security, in accordance with ITB 16; (d) written confirmation authorizing the signatory of the Bid to commit the Bidder, in accordance with ITB 17.2; (e) documentary evidence of establishing the Bidder's eligibility; (f) Bids submitted by a Joint Venture shall include a copy of the Joint Venture Agreement entered by all partners. Alternatively, a Letter of Intent to execute a Joint Venture Agreement in the event of a successful Bid shall be signed by all partners and submitted with the Bid, together with a copy of the proposed agreement. The Joint Venture agreement, or letter of intent to enter a Joint Venture including a draft agreement shall indicate at least the parts of the Works to be executed by the respective partners; (g) Table of Price Adjustment (if applicable); and (h) any other required documents required, in the **BDS**.
	11.2 The Bidder is solely responsible for the authenticity of the submitted documents.
12. Letter of Bid and Schedules	12.1 The Letter of Bid, Schedules, and all documents listed under ITB 11, shall be prepared using the relevant forms in Section IV (Bidding Forms) and in Section VI (Bill of Quantities). The forms must be completed without any alterations to the text, and no substitutes shall be accepted. All blank spaces shall be filled with the information requested.
13. Bid Prices and Discounts	13.1 The prices and discounts quoted by the Bidder in the Letter of Bid and in the Schedules shall conform to the requirements specified below.

	13.2 The Bidder shall submit a bid for the whole of the works described in ITB 1.1 by filling in prices for all items of the Works, as identified in Section VI (Bill of Quantities). In case of Unit Rate Contracts, the Bidder shall fill in rates and prices for all items of the Works described in the Bill of Quantities. Items against which no rate or price is entered into by the Bidder will not be paid for by the Employer when executed and shall be deemed covered by the rates for other items and prices in the Bill of Quantities.
	13.3 The price to be quoted in the Letter of Bid shall be the total price of the Bid, excluding any discounts offered. Absence of the total price in the Letter of Bid may result in rejection of the Bid.
	13.4 The Bidder shall quote any discounts and the methodology for their application in the Letter of Bid, in accordance with ITB 12.1.
	13.5 If so, indicated in ITB 1.1 and ITB 29.4, bids are invited for individual Contracts or for any combination of Contracts (packages). Bidders wishing to offer any price reduction for the award of more than one Contract shall specify in their bid the price reductions applicable to each package, or alternatively, to individual Contracts within the package. Price reductions or discounts shall be submitted in accordance with ITB 13.4, provided the bids for all Contracts are submitted and opened at the same time.
	13.6 Unless otherwise provided **in the BDS** and the Conditions of Contract, the prices quoted by the Bidder shall be fixed. If the prices quoted by the Bidder are subject to adjustment during the performance of the Contract in accordance with the provisions of the Conditions of Contract, the Bidder shall furnish the indices and weightings for the price adjustment formulae in the Table of Adjustment Data in Section IV (Bidding Forms) and the Employer may require the Bidder to justify its proposed indices and weightings.
	13.7All duties, taxes, and other levies payable by the Contractor under the Contract, or for any other cause, as of the date 30 days prior to the deadline for submission of bids, shall be included in the rates and prices and the total bid price submitted by the Bidder.
14. Currency of Bid and Payment	14.1 The currency of the bid and payment shall be in Nepalese Rupees.
15. Period of Validity of Bids	15.1 Bids shall remain valid for the period specified **in the BDS.** The bid validity period shall start from the bid submission deadline as prescribed by the Employer in accordance with ITB 19.1. If the prescribed bid submission deadline date falls on a government holiday, then the next working day shall be considered as the bid submission deadline date. In such case the validity period of the bids shall be considered from the original bid submission deadline date. In the case of electronic bid submission, if any technical issue arises in the handling of the e-GP system, the PPMO may extend the deadline for bid submission. However, the validity period of the bids shall still be counted from the original bid submission deadline. A bid valid for a shorter period shall be rejected by the Employer as nonresponsive.
	15.2 In exceptional circumstances, prior to the expiration of the bid validity period,

	the Employer may request Bidders to extend the period of validity of their Bids. The request and the responses shall be made in writing. If a bid security is requested in accordance with ITB 16, it shall also be extended 30 days beyond the deadline of the extended validity period. A Bidder may refuse the request without forfeiting its bid security. A Bidder granting the request shall not be required or permitted to modify its bid and to include any additional conditions against the provisions specified in Bid Documents.
16. Bid Security	16.1 The Bidder shall furnish as part of its bid, in original form, a bid security as specified **in the BDS.** In case of e-submission of bid, the Bidder shall upload scanned copy of Bid security letter at the time of electronic submission of the bid. The Bidder accepts that the scanned copy of the Bid security shall, for all purposes, be equal to the original. The details of original Bid Security and the scanned copy submitted with e-bid should be the same otherwise the bid shall be non-responsive.
	16.2 The bid security shall be, at the Bidder's option, in any of the following forms: (a) an unconditional bank guarantee from Commercial Bank or Financial Institution eligible to issue Bank Guarantee as per prevailing Law or; (b) a cash deposit voucher in the Employer's Account as specified **in BDS**. In the case of a bank guarantee, the bid security shall be submitted either using the Bid Security Form included in Section IV (Bidding Forms) or in another Form acceptable to the employer. The form must include the complete name of the Bidder. The bid security shall be valid for minimum thirty (30) days beyond the original validity period of the bid, or beyond any period of extension if requested under ITB 15.2. A bid security valid for a shorter period shall be rejected by the Employer as nonresponsive.
	16.3 Any bid not accompanied by an enforceable and substantially compliant bid security shall be rejected by the Employer as nonresponsive. In case of e-Submission, if the scanned copy of an acceptable Bid Security letter is not uploaded with the electronic Bid, then Bid shall be rejected.
	16.4 The public entity shall return the bid securities except those that are to be forfeited as per ITB 16.5 to the respective bidders within three (3) days after the successful bidder has furnished the required performance security and signed the Contract Agreement pursuant, to ITB 34.1 and ITB 35.1.
	16.5 The bid security shall be forfeited if: (a) a Bidder requests for withdrawal or modification of its bid, except as provided in ITB 15.2: (i) during the period of bid validity specified by the Bidder on the Bid, in case of electronic submission; (ii) from the period twenty-four hours prior to bid submission deadline up to the period of bid validity specified by the Bidder on the Letter of Bid, in case of hard copy submission. (b) a Bidder changes the prices or substance of the bid while providing information pursuant to ITB 24.1; (c) a Bidder involves fraud and corruption pursuant to ITB 3.1;

	(d) the successful Bidder fails to: (i) furnish a performance security in accordance with ITB 29.5, ITB 29.8 and ITB 34.1; or (ii) sign the Contract in accordance with ITB 35.1 or (iii) accept the correction of arithmetical errors pursuant to ITB 28.1; (e) if the bidder fails to inform you about the saturation of the maximum number of contracts as per ITB 4.9.
	16.6 The Bid Security of a JV shall be in the name of the JV that submits the bid. If the JV has not legally constituted at the time of bidding, the Bid Security shall be in the names of all future partners as named in the letter of intent mentioned in ITB 4.1.
17. Format and Signing of Bid	17.1 The Bidder shall prepare one original of the documents comprising the bid as described in ITB 11 and clearly mark it ORIGINAL". In addition, the Bidder shall submit copies of the bid in the number specified **in the BDS** and clearly mark each of them "COPY." In the event of any discrepancy between the original and the copies, the original shall prevail. In case of e-submission of bid, the Bidder shall submit his bid electronically in PDF or web forms files as specified in ITB Clause 18.1(b),
	17.2 The original and all copies of the bid shall be typed or written in indelible ink and shall be signed by a person duly authorized to sign on behalf of the Bidder. This authorization shall consist of a written confirmation as specified **in the BDS** and shall be attached to the bid. The name and position held by each person signing the authorization must be typed or printed below the signature. All pages of the bid, except for unamended printed literature, shall be signed or initialized by the person signing the bid.
	17.3 Any amendments such as interlineations, erasures, or overwriting shall be valid only if they are signed or initialed by the person signing the bid.
D. Submission and Opening of Bids	
18. Sealing and Marking of Bids	18.1 Unless otherwise specified **in BDS**, Bidders shall submit their bids by electronic or by mail/by hand/by courier. Procedures for submission, sealing and marking are as follows: (a) Bidders submitting bids by mail, by hand or by courier i. Bidders shall enclose the original and each copy of the Bid. These envelopes containing the original and the copies shall then be enclosed in one single envelope. ii. The inner and outer envelopes shall: (aa) bear the name and address of the Bidder; (bb) be addressed to the Employer as provided **in BDS**19.1; (cc)bear the specific identification of this bidding process indicated **in BDS** 1.1; and (dd) bear a warning not to open before the time and date for bid opening. iii. If all envelopes are not sealed and marked as required, the Employer will assume no responsibility for the misplacement or premature opening of the bid.

	(b) Bidders submitting Bids electronically shall follow the electronic bid submission procedure specified **in BDS**.
19. Deadline for Submission of Bids	19.1 Bids must be received by the Employer at the address no later than the date and time indicated **in the BDS**. In case of e-submission, the standard time for e-submission is Nepalese Standard Time as set out in the server. The e-procurement system will accept the e-submission of bid from the date of publishing of notice and will automatically not allow the e-submission of bid after the deadline for submission of bid.
	19.2 The Employer may, at its discretion, extend the deadline for the submission of bids by amending the Bidding Document in accordance with ITB 8, in which case all rights and obligations of the Employer and Bidders previously subject to the deadline shall thereafter be subject to the deadline as extended.
20. Late Bids	20.1 The Employer shall not consider any bid that arrives after the deadline for submission of bids, in accordance with ITB 19. Any bid received by the Employer after the deadline for submission of bids shall be declared late, rejected, and returned unopened to the Bidder.
21. Withdrawal, and Modification of Bids	21.1 A Bidder may withdraw or modify its bid after it has been submitted either in hard copy or by e-submission. Procedures for withdrawal or modification of submitted bids are as follows: (i) Bids submitted in hard Copy a) Bidders may withdraw or modify their bids by sending a written notice in a sealed envelope, duly signed by an authorized representative, and shall include a copy of the authorization in accordance with ITB 17.2 24 hours prior to the last deadline of submission of bid. The corresponding modification of the bid must accompany the respective written notice. All notices must be: (aa) prepared and submitted in accordance with ITB 17 and ITB 18, and in addition, the respective envelopes shall be clearly marked "WITHDRAWAL", "MODIFICATION;" and (bb) received by the Employer twenty-four hours prior to the deadline prescribed for submission of bids, in accordance with ITB 19. ii) E-submitted bids. a) Bidder may submit modification or withdrawal prior to the deadline prescribed for submission of bids through e-GP system by using the forms and instructions provided by the system.
	21.2. Bids requested to be withdrawn in accordance with ITB 21.1 shall not be opened. In case of hard copy submission, the Bid will be returned unopened to the Bidders.
	21.3 Except in case of any modification or correction in bid document made by procuring entity, Bidder may submit request for withdrawal or modification only one time. 21.4 In case of hard copy bid, no bid may be withdrawn if the bid has already been modified; except in case of any modification or correction in bid document by procuring entity.

	21.5 Request for withdrawal or modification must be made through the same medium of submission. Requests for withdrawal or modifications through different media shall not be considered.
	21.6 The following provisions apply for withdrawal or modification of the Bids: (i) In case of bids submitted in hard copy no bid shall be withdrawn or modified in the interval between 24 hours prior to the deadline for submission of bids and the expiration of the period of bid validity specified by the Bidder on the Letter of Bid or any extension thereof. (ii) In case of e-submitted bids no bids shall be withdrawn or modified in the interval between deadline for submission of bids and the expiration of the period of bid validity specified by the Bidder on the Letter of Bid or any extension thereof.
	21.7 Once a Bid is withdrawn, bidder will not be able to submit another bid for the same bid.
22. Bid Opening	22.1 The Employer shall open the bids in public at the address, date and time specified **in the BDS** in the presence of Bidders designated representatives who choose to attend.
	22.2 The Employer shall download the e-submitted bid files. The e-GP system allows the Employer to download the e-submitted bid files (report) only after bid opening date and time after login simultaneously by two members of the Bid opening committee.
	22.3 Electronically submitted bid shall be opened at first at the same time and date as specified above. Electronic Bids should be opened one by one and read out. The e-submitted bids must be readable through open standards interfaces. Unreadable and or partially submitted bid files shall be considered incomplete.
	22.4 Thereafter, envelopes marked "WITHDRAWAL" shall be opened and read out and the envelope with the corresponding bid shall not be opened but returned to the Bidder. No bid withdrawal shall be Permitted unless the corresponding withdrawal notice contains a valid authorization to request the withdrawal and is read out at bid opening. Next, envelopes marked "MODIFICATION" shall be opened and read out with the corresponding bid. No bid modification shall be permitted unless the corresponding modification notice contains a valid authorization to request the modification and is read out at bid opening. Only envelopes that are opened and read out at bid opening shall be considered further.
	22.5 All other envelopes shall be opened one at a time, reading out: the name of the Bidder; the Bid Price(s), including any discounts and alternative bids and indicating whether there is a modification; the presence of a bid security and any other details as the Employer may consider appropriate. Only discounts and alternative offers read out at bid opening shall be considered for evaluation. No bid shall be rejected at bid opening except for late bids, in accordance with ITB 20.1.

	22.6 The Employer shall prepare a record of the bid opening that shall include, as a minimum: the name of the Bidder and whether there is a withdrawal, or modification; the Bid Price, per Contract if applicable, including any discounts and alternative offers; and the presence or absence of a bid security. The Bidders' representatives who are present shall be requested to sign the record. The omission of a Bidder's signature on the record shall not invalidate the contents and effect of the record.
E. Evaluation and Comparison of Bids	
23. Confidentiality	23.1 Information relating to the examination, evaluation, comparison, and recommendation of Contract award, shall not be disclosed to Bidders or any other persons not officially concerned with such process until information on Contract award is communicated to all Bidders.
	23.2 Any attempt by a Bidder to influence the Employer in the evaluation of the bids or Contract award decisions may result in the rejection of its bid.
	23.3 Notwithstanding ITB 23.2, from the time of bid opening to the time of Contract award, if any Bidder wishes to contact the Employer on any matter related to the bidding process, it may do so in writing.
24. Clarification of Bids	24.1 To assist in the examination, evaluation, and comparison of the bids, the Employer may, at its discretion, ask any Bidder for clarification of its bid. Any clarification submitted by a Bidder that is not in response to a request by the Employer shall not be considered. The Employer's request for clarification and the response shall be in writing. No change in the prices or substance of the bid shall be sought, offered, or permitted, except to confirm the correction of arithmetic errors discovered by the Employer in the evaluation of the bids, in accordance with ITB 28. In case of e-submission of bid, upon notification from the employer, the bidder shall also submit the original of documents comprising the bid as per ITB 11.1 for verification of submitted documents for acceptance of the e-submitted bid.
	24.2 If a Bidder does not provide clarifications of its bid by the date and time set in the Employer's request for clarification, its bid shall be rejected.
25. Deviations, Reservations, and Omissions	25.1 During the evaluation of bids, the following definitions apply: (a) "Deviation" is a departure from the requirements specified in the Bidding Document; (b) "Reservation" is the setting of limiting conditions or withholding from complete acceptance of the requirements specified in the Bidding Document; and (c) "Omission" is the failure to submit part or all of the information or documentation required in the Bidding Document.
26. Determination of Responsiveness	26.1 The Employer's determination of a bid's responsiveness is to be based on the contents of the bid itself, as defined in ITB 11.
	26.2 A substantially responsive bid is one that meets the requirements of the Bidding Document without material deviation, reservation, or omission. A material deviation, reservation, or omission is one that, (a) if accepted, would: (i) affect in any substantial way the scope, quality, or performance of the

	Works specified in the Contract; or (ii) limit in any substantial way, inconsistent with the Bidding Document, the Employer's rights or the Bidder's obligations under the proposed Contract; or (b) if rectified, would unfairly affect the competitive position of other Bidders presenting substantially responsive bids.
	26.3 If a bid is not substantially responsive to the requirements of the Bidding Document, it shall be rejected by the Employer and may not subsequently be made responsive by correction of the material deviation, reservation, or omission.
	26.4 In case of e-submission bids, the Employer evaluates the bid on the basis of the information in the electronically submitted bid files. If the Bidder cannot substantiate or provide evidence to establish the information provided in e-submitted bid through documents/ clarifications as per ITB Clause 24.1, the bid shall not be considered for further evaluation.
27.Nonconformities, Errors, and Omissions	27.1 Provided that a bid is substantially responsive, the Employer may waive any non-conformities in the bid that do not constitute a material deviation, reservation, or omission.
	27.2 Provided that a bid is substantially responsive, the Employer may request that the Bidder submit the necessary information or documentation, within a reasonable period of time, to rectify nonmaterial nonconformities in the bid related to documentation requirements. Requesting information or documentation on such nonconformities shall not be related to any aspect of the price of the bid. Failure of the Bidder to comply with the request may result in the rejection of its bid.
	27.3 Provided that a bid is substantially responsive, the Employer shall rectify quantifiable nonmaterial nonconformities related to the Bid Price. To this effect, the Bid Price shall be adjusted, for comparison purposes only, to reflect the price of a missing or non-conforming item or component. The adjustment shall be made using the methods indicated in Section III (Evaluation and Eligibility Criteria).
	27.4 If the monetary value of such non-conformities is found to be more than fifteen percent of the Bid Price of the bidder on account of minor discrepancies pursuant to ITB 27.3, such bid shall be considered non responsive and shall not be involved in evaluation.
28. Correction of Arithmetical Errors	28.1 Provided that the bid is substantially responsive, the Employer shall correct arithmetical errors on the following basis: (a) only for unit price Contracts, if there is a discrepancy between the unit price and the total price that is obtained by multiplying the unit price and quantity, the unit price shall prevail and the total price shall be corrected, unless in the opinion of the Employer there is an obvious misplacement of the decimal point in the unit price, in which case the total price as quoted shall govern and the unit price shall be corrected; (b) if there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail and the total shall be corrected; and (c) If there is a discrepancy between the bid price in the Summary of Bill of

	Quantities and the bid amount in item (c) of the Letter of Bid, the bid price in the Summary of Bill of Quantities will prevail and the bid amount in item (c) of the Letter of Bid will be corrected. (d) if there is a discrepancy between words and figures, the amount in words shall prevail, unless the amount expressed in words is related to an arithmetic error, in which case the amount in figures shall prevail subject to (a) ,(b) and (c) above.
	28.2 If a Bidder does not accept the correction of arithmetical errors, its bid shall be disqualified, and its bid security shall be forfeited.
29. Evaluation of Bids	29.1 The Employer shall use the criteria and methodologies listed in this Clause. No other evaluation criteria or methodologies shall be permitted.
	29.2 To evaluate a bid, the Employer shall consider the following: (a) the bid price, excluding Value Added Tax and Provisional Sums in the Summary Bill of Quantities, for Unit Rate Contracts, or Schedule of Prices for lump sum Contracts, but including Day work items, where priced competitively; (b) adjustment for correction of arithmetic errors in accordance with ITB 28.1; (c) adjustment due to discounts offered in accordance with ITB 13.4; (d) adjustment for nonconformities in accordance with ITB 27.3; (e) application of all the evaluation factors indicated in Section III (Evaluation and Eligibility Criteria); If the evaluated Bid Price of the Bidder is more than 30 (thirty) percent below or substantially higher than the cost estimate, the Employer shall reject the Bid as non-responsive.
	29.3 The estimated effect of the price adjustment provisions of the Conditions of Contract, applied over the period of execution of the Contract, shall not be taken into account in bid evaluation.
	29.4 If this Bidding Document allows Bidders to quote separate prices for different Lots (Contracts), and to award multiple Contracts to a single Bidder **as specified in BDS**, the methodology to determine the lowest evaluated price of the Contract combinations, including any discounts offered in the Letter of Bid, is specified in Section III (Evaluation and Eligibility Criteria).
	29.5 If the bid for a Unit Rate Contract, evaluated as per ITB 30.1, is front-loaded or has quoted abnormally high rate for any item believing that the item was underestimated, the Employer **shall** require the Bidder to provide clarification along with detailed rate analysis, for any or all items of the Bill of Quantities as per ITB 24.1. The rate analysis submitted shall be analyzed and compared against prevailing norms and rates, on the basis of the work execution methodology, technology, and management methods specified by the bidder. If the clarification is deemed unsatisfactory, the Employer shall require that the amount of performance security be increased at the expense of the Bidder as **specified in BDS**.
	29.6 In case of e-submission bids, the Employer evaluates the bid on the basis of the information in the electronically submitted bid files. If the Bidder cannot substantiate or provide evidence to establish the information provided in e-submitted bid through documents/ clarifications as per ITB Clause 24.1, the bid

	shall not be considered for further evaluation.
	29.7 If all the Bids evaluated are substantially higher than the cost estimate, the employer may negotiate with the bidder who submitted the lowest evaluated substantially responsive Bid to propose a lump sum discount rate in order to bring the bid price within the approved cost estimate. However, no change in the substance of the bid is permitted during the negotiations.
	29.8 If no agreement can be reached as per ITB 29.7, the employer shall cancel the procurement proceedings.
30. Comparison of Bids	30.1 The Employer shall compare all substantially responsive bids in accordance with ITB 29.2. The Employer shall determine the Average Bid Price of all the substantially responsive Bids. The Bid Price which is closest to the Average Bid Price AND is not substantially higher than the cost estimate shall be selected for awarding the contract. In case two or more Bid Prices are determined to be equally closest to the Average Bid Price, the Bid Price which is below the Average Bid Price shall be selected for awarding the contract.
	30.2 While evaluating the Bid Price as per ITB 30.1, if the Bid Price of two or more Bidders is found to be equal, the Employer shall select the bid for awarding the contract by drawing of lots in presence of Bidders' designated representatives who choose to attend in date, time and place as notified by the Employer in writing to the concerned bidders. The Bidders' representatives who are present shall be requested to sign a record evidencing their attendance. The omission of a Bidder's signature on the record or the absence of a Bidder during the drawing of lots shall not invalidate the contents and the effect of the record. The method of drawing of lots shall be determined by the Employer.
31. Employer's Right to Accept Any Bid, and to Reject Any or All Bids	31.1 The Employer reserves the right to accept or reject any bid, and to annul the bidding process and reject all bids at any time prior to Contract award, without thereby incurring any liability to Bidders. In case of annulment, all bids submitted and specifically, bid securities, shall be promptly returned to the Bidders.
	31.2 The public entity shall give notice of the rejection of bids or the cancellation of the procurement proceedings pursuant to ITB 31.1, along with the reasons for such rejection or cancellation, to all bidders participating in the bid**.**
	31.3 Where any bidder requests, within thirty (30) days of the communication of the notice pursuant to ITB 31.2, the grounds for the rejection of all bids or the cancellation of the procurement proceedings, the public entity shall provide such information to that bidder**.**
F. Award of Contract	
32. Award Criteria	32.1 The Employer shall award the Contract to the Bidder whose Bid Price is selected as per ITB 29.7, ITB 30.1 or ITB 30.2 and is substantially responsive to the Bidding Document, provided further that the Bidder is determined to be qualified to perform the Contract satisfactorily.
33. Letter of Intent to Award the Contract/Notific	33.1 The Employer shall notify the concerned Bidder whose bid has been selected in accordance with ITB 32.1 within seven days of the selection of the bid, in writing that the Employer has intention to accept its bid and the information

ation of Award	regarding the name, address and amount of selected bidder shall be given to all other bidders who submitted the bid.
	33.2 After issuance of the notice under ITB 33.1 if the concerned bidder provides information pursuant to ITB 4.9 regarding saturation of maximum number of contracts, the employer shall disqualify the bidder and shall select the next Bidder whose Bid Price is closest to the previously determined Average Bid Price in accordance with ITB 32.1 and notify accordingly as per ITB 33.1.
	33.3 If no bidder submits an application pursuant to ITB 36 within a period of seven days of the notice provided under ITB 33.1, the Employer shall, accept the bid selected in accordance with ITB 32.1 and Letter of Acceptance shall be communicated to the selected bidder prior to the expiration of period of Bid validity, to furnish the performance security and sign the contract within fifteen days.
	33.4 After communicating letter of acceptance under ITB 33.3, if the concerned bidder provides information pursuant to ITB 4.9 regarding saturation of maximum number of contracts, the employer shall reject the bid of that bidder and shall select the next Bidder whose Bid Price is closest to the previously determined Average Bid Price in accordance with ITB 32.1 and shall issue the notice accordingly as per ITB 33.1. In such case bid security of the rejected bidder shall not be forfeited.
34. Performance Security	34.1 Within Fifteen (15) days of the receipt of Letter of Acceptance from the Employer, the successful Bidder shall furnish the performance security in an amount equal to 5 (five) percent of the Bid Price from Commercial Bank or Financial Institution eligible to issue Bank Guarantee as per prevailing Law in Nepal in accordance with the conditions of Contract using Sample Form for the Performance Security included in Section IX (Contract Forms), or another form acceptable to the Employer. The Bid Price shall be without VAT but including Provisional Sum.
	34.2 Failure of the successful Bidder to submit the above-mentioned Performance Security or to sign the Contract Agreement shall constitute sufficient grounds for the annulment of the award and forfeiture of the bid security. In that event the Employer may award the Contract to the next Bidder whose Bid Price is closest to the previously determined Average Bid Price in accordance with ITB 32.1 whose offer is substantially responsive and is determined by the Employer to be qualified to perform the Contract satisfactorily. The process shall be repeated according to ITB 33.
35. Signing of Contract	35.1 The Employer and the successful Bidder shall sign the Contract Agreement within the period as stated ITB 34.1.
	35.2 At the same time, the Employer shall affix a public notice on the result of the award on its notice board and make arrangement for causing such notice to be affixed on the notice board also of the **District Coordination Committee, District Administration Office, Provincial Treasury and Controller Office and District Treasury and Controller Office**. The Employer may make arrangements to post the notice into its website, if it has; and if it does not have, into the website of the Public Procurement Monitoring Office, identifying the

	bid and lot numbers and the following information: (i) the result of evaluation of bid; (ii) date of publication of notice inviting bids; (iii) name of newspaper; (iv) reference number of notice; (v) item of procurement; (vi) name and address of bidder making contract and (vii) contract price.
	35.3 Within thirty (30) days from the date of issuance of notification pursuant to ITB 33.1 unsuccessful bidders may request in writing to the Employer for a debriefing seeking explanations on the grounds on which their bids were not selected. The Employer shall promptly respond in writing to any unsuccessful Bidder who, requests for debriefing.
	35.4 If the bidder whose bid is accepted fails to sign the contract as stated ITB 35.1, the Public Procurement Monitoring Office shall blacklist the bidder on recommendation of the Public Entity.
36. Complaint and Review	36.1 If a Bidder is dissatisfied with the Procurement proceedings or the decision made by the Employer in the intention to award the Contract, it may file an application to the Chief of the Public Entity within Seven (7) days of providing the notice under ITB 33.1 by the Public Entity, for review of the proceedings stating the factual and legal grounds.
	36.2 Late application filed after the deadline pursuant to ITB 36.1 shall not be processed.
	36.3 The chief of Public Entity shall, within five (5) days after receiving the application, give its decision with reasons, in writing pursuant to ITB 36.1: (a) whether to suspend the procurement proceeding and indicate the procedure to be adopted for further proceedings; or (b) to reject the application. The decision of the chief of Public Entity shall be final.

SECTION - II
Bid Data Sheet

This section consists of provisions that are specific to each procurement and supplement the information or requirements included in Section I. Instructions to Bidders.

A. General	
ITB 1.1	The number of the Invitation for Bids is : KUKL.LTR/NCB-11/083/084
ITB 1.1	The Employer is: Kathmandu Upatyaka Khanepani Limited, Lalitpur Branch Office.
ITB 1.1	**Multiple Contract or lots (contracts) is *Not Applicable***
ITB 2.1	The name of the Project is: ***Supply and Laying of 150mm dia DI Pipe (Secondary Pipe) at Lalitpur Metropolitan City-02, from Heritage Garden to Kantihitti, Kalika Mandir***
ITB 4.1 (a)	Maximum number of partner in a joint venture shall be : ***3 (three)***
ITB 4.2	Eligible countries: ***Nepal***
ITB 4.4	For GoN: https://blacklist.ppmo.gov.np/blacklisted
ITB 4.8 & ITB 4.9	The Bidder, including all parties constituting the Bidder, shall be ineligible to participate in the open competitive bidding process if it has already secured **five (5)** construction contracts (in open competitive bidding) and has not yet completed the work as stipulated in the respective contracts. Following Procurement of Works contracts shall not be counted for this purpose: a) The works for which tender were invited or contracts accepted before 2078-12-03 B.S (March 17, 2022 A.D) b) The works for which tender have been invited and contracts accepted after 2078-12-03 B.S (March 17, 2022 A.D) but the work acceptance report has been approved according to Rule 117 of PPR. c) The works for which tenders were invited or contracts accepted under all types of foreign assistance.
ITB 5.1	For the purpose of Country of Origin: "all Countries"
B. Bidding Document	
ITB 7.1	For clarification purposes only, the Employer's address is: Attention: KUKL, Lalitpur Branch Office , Address: KUKL, Lalitpur Branch Office Jawalakhel, Lalitpur Telephone: : 015916240 Electronic mail address: lalitpur@kukl.org.np
ITB 7.4	A Pre-Bid meeting shall be held. Pre-Bid Meeting will Take place on the following date, time and place: Date: 2083/08/15 Time: 02:00 P.M onwards Place: KUKL, Lalitpur Branch Office,

	Jawalakhel, Lalitpur. A site visit ***"shall not be***" organized by the Employer.
ITB 7.5	Time for request: Requests for clarification should be received by the Employer no later than 10 days prior to the deadline for submission of bids.
C. Preparation of Bids	
ITB 10.1	The language of the bid is: English / Nepali
ITB 11.1 (b)	In accordance with ITB 12 and ITB 14, the following schedules shall be submitted with the bid, including the priced Bill of Quantities for Unit Rate Contracts and Schedule of Prices for lump sum contracts: _____
ITB 11.1 (h)	The Bidder shall submit with its bid the following additional documents:
ITB 13.6	The prices quoted by the Bidder ***"shall not be"*** subject to adjustment during the performance of the Contract.
ITB 15.1	The bid validity period shall be: ***Ninety (90) days***.
ITB 16.1	The Bidder shall furnish a bid security, from Commercial Bank or Financial Institution eligible to issue Bank Guarantee as per prevailing Law in Nepal with a minimum of **NRs *1,46,000.00 (Rupees One Lakh Forty Six Thousand Only.)*** which shall be valid for 30 days beyond the validity period of the bid.
ITB 16.2 (b)	Account Name: Kathmandu Upatyaka Khanepani Limited, Lalitpur Branch Bank Name: Everest Bank Limited. Bank Address: Pulchowk Branch, Lalitpur Account Number: 01200105200018
ITB 17.1	In addition to the original of the bid, the number of copy/ies is/are: ***Not Applicable.***
ITB 17.2	The written confirmation of authorization to sign on behalf of the Bidder shall indicate: (a) The name and description of the documentation required to demonstrate the authority of the signatory to sign the Bid such as a Power of Attorney; and (b) In the case of Bids submitted by an existing or intended JV, an undertaking signed by all parties (i) stating that all parties shall be jointly and severally liable, and (ii) nominating a Representative who shall have the authority to conduct all business for and on behalf of any and all the parties of the JV during the bidding process and, in the event the JV is awarded the Contract, during contract execution.
D. Submission and Opening of Bids	
ITB 18.1	Bidders shall have the option of submitting their bids ***by mail / by hand / by courier***
ITB 18.1 (b)	**Electronic bid submission procedure:** (a) Bidders submitting Bids electronically shall follow the electronic bid submission procedures specified in this clause. i. Bidders who choose to submit their bids electronically, can view/download the

bidding documents from ***"published bids"*** section of e-GP system, https://bolpatra.gov.np/egp.

ii. For the purpose of e-Submission, the bidder shall, first, register in e-GP system and maintain their organization profile data and documents required during bid response preparation. The details of e-GP registration and profile management procedure are specified in Article No 9 and 10 respectively of e-GP Directives issued by PPMO, which can be downloaded from ***Download section*** of e-GP system.

iii. The bidders shall prepare their bids using data and documents maintained in bidder's profile, instruction provided by e-GP system and forms/format provided in the bidding document.

iv. Bidders may submit bids as a single entity or as a joint venture (JV). Bidder submitting bid in JV shall have to upload joint venture agreement along with partner(s) Bolpatra ID provided during bidder's registration.

v. Bidders (all partners in case of JV) shall update their profile data and documents required during preparation and submission of their bids.

vi. In case of bid submission in JV, the consent of the partners shall be obtained through the confirmation link sent to the registered email address and the partners shall have to acknowledge their confirmation.

vii. Bidders shall submit the required documents as specified in Section I-Instruction to Bidders, Section II-Bid Data Sheet and Section III-Evaluation and Eligibility Criteria of the bidding document. The format of the documents shall be in PDF and/or web form as provisioned in the e-GP system.

The required forms and documents shall be part of bid.

No.	Document	Requirement	Remarks
1.	Letter of Bid	Mandatory	PDF
2.	Bid Security / Bank Guarantee	Mandatory	PDF
3.	Firm or Company registration Certificate	Mandatory	PDF
4.	VAT and PAN registration Certificate	Mandatory **(**for domestic bidders only)	PDF
5.	Business Registration Licence	Mandatory	PDF
6.	Tax Clearance Certificate / Tax return submission evidence / evidence of time extension	Mandatory **(**for domestic bidders only)	PDF
7.	Power of Attorney of Bid signatory	Mandatory	PDF
8.	Joint venture agreement	Mandatory in case of JV Bids Only	PDF
9.	Completed Bill of Quantities (BoQ)	Mandatory	PDF

	10.	Price Adjustment Table (if Applicable)	Mandatory (If Applicable)	PDF
	11.	Additional documents specified in ITB 11.2 (h)	Mandatory (If any)	PDF

Note:

a) The documents specified as "Mandatory" should be included in e-submission and non-submission of the documents shall be considered as non-responsive bid.

b) Bidders (all partners in case of JV) should verify/update their profile documents as appropriate for the specific bid before submitting their bid electronically.

viii. After providing all the details and documents, the e-GP system will generate bid response documents for the bidder. Bidders shall download, verify and confirm the bid response documents prior to bid submission.

ix. For verifying the authentic user, the system will send one time password (OTP) in the registered e-mail address of the bidder. System will validate the OTP and then only allow bidders to submit their bid.

x. Electronically submitted bids can be modified and/or withdrawn through the system within the bid submission deadline.

xi. The bidder/bid shall meet the following requirements and conditions for e-submission of bids;

aa) The e-submitted bids must be readable through PDF reader.

bb) The bidders are fully responsible for using the e-GP system as per specified procedures and in no case shall the employer be held liable for bidder's inability to use the system.

cc) When a bidder submits electronic bids through the e-GP System, it is assumed that the bidder has prepared the bid by studying and examining the complete set of the bidding document and e-GP instruction including the provision stipulated in e-GP Directives.

ITB 19.1	**For bid submission purposes only, the Employer's address is :** Attention: Kathmandu Upatyaka Khanepani Limited, Lalitpur Branch Office Address: Jawalakhel, Lalitpur **The deadline for bid submission is :** Date : 2083/08/23 Time : 12:00 P.M
ITB 22.1	The bid opening shall take place at : Address : KUKL, Lalitpur Branch Office, Jawalakhel, Lalitpur. Date : 2083/08/23 Time : 0***1:00 P.M***
E. Evaluation and Comparison of Bids	

ITB 29.4	Bidders are ***"not permitted"*** to quote separate prices for lots (Contracts), and a single Bidder will be awarded multiple lots (Contracts) based on provision of ***Paragraph 1.1, Multiple Contracts Section III (Evaluation and Eligibility Criteria):***
ITB 29.5	The amount of the performance security be increased by Eight (8) percent of the quoted bid price (without VAT but Including PS).

SECTION - III

Evaluation and Eligibility Criteria

This Section contains all the criteria that the Employer shall use to evaluate bids and eligible Bidders. GoN/DP requires bidders to be qualified by meeting predefined eligibility criteria. In accordance with ITB 29, no other methods, criteria and factors shall be used. The Bidder shall provide all the information requested in the forms included in Section IV (Bidding Forms).

1. Evaluation

In addition to the criteria listed in ITB 29.2 (a) - (e) the following criteria shall apply:

1.1 Multiple Contracts

Pursuant to Sub-Clause ITB 29.4 of the Instructions to Bidders, if Works are grouped in multiple contracts, evaluation will be as follows:

Works are grouped in multiple contracts and pursuant to Sub-Clause 29.4 of the Instructions to Bidders, the Employer will evaluate and compare Bids on the basis of a contract, or a combination of contracts, or as a total of contracts in order to arrive at the least cost combination for the Employer by taking into account discounts offered by Bidders in case of award of multiple contracts.

1.2 Quantifiable Nonconformities and Omissions

Subject to ITB 13.2 and ITB 29.2, the evaluated cost of quantifiable nonconformities including omissions, is determined as follows:

[***Insert in bidding document:*** "Pursuant to ITB 27.3, the cost of all quantifiable nonmaterial nonconformities shall be evaluated, but excluding omission of prices in the Bill of Quantities. The Employer will make its own assessment of the cost of any nonmaterial nonconformities and omissions for the purpose of ensuring fair comparison of bids."]

2. Eligibility

Criteria	Compliance Requirements				Documents
Requirement	Single Entity	Joint Venture			Submission Requirements
		All Partners Combined	Each Partner	One Partner	
2.1 Conflict of Interest					
No conflicts of interest in accordance with ITB Sub-Clause 4.3.	must meet requirement	existing or intended JV must meet requirement	must meet requirement	not applicable	Letter of Bid
2.2 Government/DP Eligibility					
Not having been declared ineligible by government/DP, as described in ITB Sub-Clause 4.4.	must meet requirement	must meet requirement	must meet requirement	not applicable	Letter of Bid
2.3 Government-owned Entity					
Bidder required to meet	must meet	existing or	must meet	not	Letter of Bid,

conditions of ITB Sub-Clause 4.5.	requirement	intended JV must meet requirement	requirement	applicable	Forms ELI - 1, ELI - 2, with attachments
2.4 UN Eligibility					
Not having been declared ineligible based on a United Nations resolution or Employer's country law, as described in ITB Sub-Clause 4.7.	must meet requirement	existing or intended JV must meet requirement	must meet requirement	not applicable	Letter of Bid
2.5 Bidder's Running Contracts					
Bidder's have not yet secured five (5) number of construction contracts[2](in open competitive bidding) as described in ITB Sub-Clause 4.8.	must meet requirement	existing or intended JV must meet requirement	must meet requirement	not applicable	Letter of Bid, Form ELI-3
2.6 Other Eligibility					
Firm or Company Registration Certificate	must meet requirement	not applicable	must meet requirement	not applicable	Document attachment
Business Registration License	must meet requirement	not applicable	must meet requirement	not applicable	Document attachment
VAT and PAN Registration certificate	must meet requirement	not applicabl	must meet requirement	not applicable	Document attachment
Tax clearances certificate for the F/Y 2082/083 or Tax return submission evidence or evidence of tax time extension upto 2083/09/30	must meet requirement	not applicable	must meet requirement	not applicable	Document attachment
Additional requirements ***[Insert if any]***	…….	……	……	……	……

[2]Note: Following Procurement of Works contracts shall not be counted for this purpose:

a) The works for which tender were invited or contracts accepted before 2078-12-03 B.S or March 17, 2022 A.D

b) The works for which tender have been invited and contracts accepted after 2078-12-03 B.S or i.e March 17, 2022 A.D and accepted but the work acceptance report has been approved according to Rule 117 of PPR.

c) The works for which tenders were invited or contracts accepted under all types of foreign assistance

SECTION - IV

Bidding Forms

This Section contains the forms which are to be completed by the Bidder and submitted as part of its Bid.

Letter of Bid

The Bidder must accomplish the Letter of Bid in its letterhead clearly showing the Bidder's complete name and address.

Date: .....

Name of the contract: .....

Invitation for Bid No.: .....

To: ***[Insert Complete name of Employer]***
……

We, the undersigned, declare that:

(a) We have examined and have no reservations to the Bidding Documents, including Addenda issued in accordance with Instructions to Bidders (ITB) Clause 8;

(b) We offer to execute in conformity with the Bidding Documents the following Works: ***[Insert Description of the works].***

(c)The total price of our Bid, excluding any discounts offered in item (d) below is: ***[Insert one of the options below as appropriate]*** or when left blank is the Bid Price indicated in the Bill of Quantities.

Option 1, in case of single contract: Total price is: ***[insert the total price of the Bid in words and figures]***;

Or

Option 2, in case of multiple lots (contracts): (i) Total price of each lot (contracts): ***[insert the total price of each lot in words and figures]***; (ii) Total price of subject contract [say Lot1] and Lot2 [another contract] [insert the total price in words and figures]; (iii) Total price of subject contract [say Lot1]and Lot3 [another contract] ***[insert the total price in words and figures]***; Total price of subject contract [say Lot1], Lot2 [another contract], Lot3 [another contract], ***……...[insert the total price in words and figures];***

(d) The discounts offered and the methodology for their application for subject contract [single contract] are:…….. [For Bidding Documents not provisioning multiple contracts]

Add following if Bidding Document provisions applicability of multiple contracts

The discounts offered and the methodology for their application for subject contract [say Lot1] and Lot2 [another contract] are:……..

The discounts offered and the methodology for their application for subject contract [say Lot1] and Lot3 [another contract] are:……..

The discounts offered and the methodology for their application for subject contract [say Lot1], Lot2 [another contract] and Lot3 [another contract],……,
are:……..

[Note:

1. Formulate possible combinations depending upon the number of lots under Bidding Process and modify accordingly Paragraph (c) and (d)]

(e) Our bid shall be valid for a period of ……..***[insert validity period as specified in ITB 15.1]*** days from the date fixed for the bid submission deadline in accordance with the Bidding Documents, and it shall remain binding upon us and may be accepted at any time before the expiration of that period;

(f) If our bid is accepted, we commit to obtain a performance security in accordance with the Bidding Document;

(g) Our firm, including any subcontractors or suppliers for any part of the Contract, have nationalities from eligible countries or any countries [insert the nationality of the Bidder, including that of all parties that comprise the Bidder if the Bidder is a consortium or association, and the nationality of each Subcontractor and Supplier];

(h) We, including any subcontractors or suppliers for any part of the contract, do not have any conflict of interest in accordance with ITB 4.3;

(i) We are not participating, as a Bidder or as a subcontractor, in more than one bid in this bidding process in accordance with ITB 4.3;

(j) Our firm, its affiliates or subsidiaries, including any Subcontractors or Suppliers for any part of the contract, has not been declared ineligible, under the Employer's country laws or official regulations or by an act of compliance with a decision of the United Nations Security Council;

(k) *[*We are not a government owned entity*] / [*We are a government owned entity but meet the requirements of ITB 4.5*];* [*]

(l) We understand that this bid, together with your written acceptance thereof included in your notification of award, shall constitute a binding contract between us, until a formal contract is prepared and executed;

(m) We declare that, we have not been black listed as per ITB 3.4 and no conflict of interest in the proposed procurement proceedings and we have not been punished for an offense relating to the concerned profession or business.

(n) We declare that we have not yet secured five (5) number of constructions contracts[3] (in open

[*] Note: Use one of the two options as appropriate.

[3] Note: Following Procurement of Works contracts shall not be counted for this purpose

a) The works for which tender were invited or contracts accepted before 2078-12-03 B.S (March 17, 2022 A.D).

competitive bidding) as described in ITB Sub-Clause 4.9.

(o) We understand that you are not bound to accept the bid closest to the Average Bid Price or any other bid that you may receive; and

(p) If awarded the contract, the person named below shall act as Contractor's Representative:

(q) We agree to permit the Employer/DP or its representative to inspect our accounts and records and other documents relating to the bid submission and to have them audited by auditors appointed by the Employer.

(r) We declare that we are solely responsible for the authenticity of the documents submitted by us. The document and information submitted by us are true and correct. If any document/information given is found to be concealed at a later date, we shall accept any legal actions by the Employer.

Name: ***[insert complete name of the person signing the Bid]***.....

In the capacity of ***[insert legal capacity of person signing the Bid]***.....

Signed ***[signature of the person whose name and capacity are shown above]***……

Duly authorized to sign the Bid for and on behalf of ***[insert complete name of the Bidder]***……

Date ***[insert date of signing]***…….....

b) The works for which tender have been invited and contracts accepted after 2078-12-03 B.S (March 17, 2022 A.D) and accepted but the work acceptance report has been approved according to Rule 117 of PPR.

c) The works for which tenders were invited or contracts accepted under all types of foreign assistance.

Table of Price Adjustment Data[4]

[To be used if Price Adjustment is applicable as per GCC 53.1]

Code	Index Description	Source of Index*	Base Value and Date	Employer's Proposed Weighting Range (coefficient)	Bidder's Proposed Weighting (coefficient)**
1	**2**	**3**	**4**	**5**	**6**
	Non - adjustable (A)			0.15	0.15
	Labor (b)				
	Materials (c)***				
	…				
	Equipment usage (d)				
		Total			**1.00**

*Normally following source of index shall apply. Public Entity shall choose applicable Index for each item.

(a) Labor:

"National Salary and Wage Rate Index"- "Construction Labor" of Nepal Rastra Bank

or

rate fixed by District Rate Fixation Committee

(b) Material: "National Wholesale Price Index" - Construction Materials" of Nepal Rastra Bank

(c) Equipment usage:

"National Wholesale Price Index"-"Machinery and Equipment" of Nepal Rastra Bank

or

"Fuel" Price fixed by Nepal Oil Corporation.

** Bidders proposed weightings should be within the range specified by the Employer in column - 5

***Note: The materials can be broken down into major construction materials if necessary. In this case the source of index shall be the specified by Employer, preferably as per the published ex-factory price or published price from the sole authorized seller.

[4] Non-compliance of the data (stipulated by the bidder in this table) with requirements described here shall not be grounds for bid rejection and such non-compliance will be subject to clarification and rectification prior to contract award.

Table of Price Adjustment Data[5]

[To be used if Price Adjustment is applicable as per GCC 53.6]

Code	Construction Material*	Unit	Base Price (NRs/Unit) (Ex-factory)	Source (Factory)**
1	**2**	**3**	**4**	**5**

* Major construction materials to be specified by Employer in column - 2.

** Base Price and source normally to be specified by Employer (or alternatively informed to be proposed by bidder) in column 4 and5.

Note:
The base prices of the construction materials shall be taken as of 30 days before the deadline for submission of the Bid as quoted by the Bidder and verified by the Employer. For the purpose of calculation of price adjustment, the Ex-factory price of the same source shall be taken into consideration.

[5] Non-compliance of the data (stipulated by the bidder in this table) with requirements described here shall not be grounds for bid rejection and such non-compliance will be subject to clarification and rectification prior to contract award.

Bid Security

Bank Guarantee

Bank's Name, and Address of Issuing Branch or Office

(On letterhead paper of the Bank)

Beneficiary: ..... ***[Insert name and address of Employer]*** …….

Date: ……...

Bid Security No.: .....

We have been informed that . …….. ***.[insert name of the Bidder]*** (hereinafter called "the Bidder") intends to submit its bid (hereinafter called "the Bid") to you for the execution of ……..... ***[Insert name of Contract .*** …… under Invitation for Bids No. ……***[insert IFB No.]*** ("the IFB").

Furthermore, we understand that, according to your conditions, bids must be supported by a bid guarantee.

At the request of the Bidder, we…….. . ***[Insert name of Bank]*** …….. hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of Nepalese Rupees. . ***……....[Insert amount in figures and amount in words]*** upon receipt by us of your first demand in writing accompanied by a written statement stating that the Bidder is in breach of its obligation(s) under the bid conditions, because the Bidder:

(a) has withdrawn or modifies its Bid:

(i) during the period of bid validity specified by the Bidder on the Letter Bid, in case of electronic submission

(ii) from the period twenty-four hours prior to bid submission deadline up to the period of bid validity specified by the Bidder on the Letter of Bid, in case of hard copy submission; or

(b) does not accept the correction of errors in accordance with the Instructions to Bidders (hereinafter "the ITB"); or

(c) having been notified of the acceptance of its Bid by the Employer during the period of bid validity, (i) fails or refuses to execute the Contract Agreement, or (ii) fails or refuses to furnish the performance security, in accordance with the ITB; or

(d) is involved in fraud and corruption in accordance with the ITB; or

(e) a Bidder changes the prices or substance of the bid while providing information pursuant to ITB 24.1; or

(f) if the bidder fails to inform about the saturation of the maximum number of contracts as per ITB 4.9.

This guarantee will remain in force up to and including the date ……**number**……days after the deadline for submission of Bids as such deadline is stated in the instructions to Bidders or as it may be extended by the Employer, notice of which extension(s) to the Bank is hereby waived. Any demand in respect of this guarantee should reach the Bank not letter than the above date.

This Bank guarantee shall not be withdrawn or released merely upon return of the original guarantee by the Bidder unless notified by you for the release of the guarantee.

This guarantee is subject to the Uniform Rules for Demand Guarantees (URDG), 2010 Revisions, ICC Publication No. 758 .except that the supporting statement under Article 15(a) is hereby excluded.

. . .Bank's seal and authorized signature(s) . . .

Note:

The bid security of ……..……. has been counter guaranteed by the Bank ……..……... ...…… on ……....……..……. (Applicable for Bid Security of Foreign Banks).

Bidder's Information Format

Site Organization

Method Statement

Mobilization Schedule

Construction Schedule

Others

Bidder's Information

Form ELI - 1: Bidder's Information Sheet

Bidder's Information	
Bidder's legal name	
In case of JV, legal name of each partner	
Bidder's country of constitution	
Bidder's year of constitution	
Bidder's legal address in country of constitution	
Bidder's authorized representative (name, address, telephone numbers, fax numbers, e-mail address)	
Attached are copies of the following original documents.	
1. In case of single entity, articles of incorporation or constitution of the legal entity named above, in accordance with ITB 4.1 and 4.2. 2. Authorization to represent the firm or JV named above, in accordance with ITB 17.2. 3. In case of JV, letter of intent to form JV or JV agreement, in accordance with ITB 4.1. 4. In case of a government-owned entity, any additional documents not covered under 1 above are required to comply with ITB 4.5.	

Form ELI - 2: JV Information Sheet

Each member of a JV must fill in this form

JV / Specialist Subcontractor Information	
Bidder's legal name	
JV Partner's or Subcontractor's legal name	
JV Partner's or Subcontractor's country of constitution	
JV Partner's or Subcontractor's year of constitution	
JV Partner's or Subcontractor's legal address in country of constitution	
JV Partner's or Subcontractor's authorized representative information (name, address, telephone numbers, fax numbers, e-mail address)	
Attached are copies of the following original documents.	
1. articles of incorporation or constitution of the legal entity named above, in accordance with ITB 4.1 and 4.2. 2. Authorization to represent the firm named above, in accordance with ITB .2. 3. In the case of government-owned entity, documents establishing legal and financial autonomy and compliance with commercial law, in accordance with ITB 4.5.	

Form ELI - 3: Bidder's Running Contracts****

Each member of a JV must fill in this form

	Bidder's Running Contracts				
Name of office	**Contract Identification no.**	**Source of Fund***	**Date of issuance of Letter of Acceptance**	**Status of contract****	**Date of Issuance of Taking Over Certificate*****

* Mention GON funded or DP funded or Other PE (Insert name) funded

** Mention "Yet to sign" if contract is not signed, "Running" if contract has been signed and contract is running and "Substantially completed" if taking over certificate has been issued.

*** Insert date of issuance of taking over certificate if the awarded contract has been substantially completed and taking over certificate has been issued.

****Note: Following Procurement of Works contracts shall not be counted for this purpose

a) The works for which tender were invited or contracts accepted before 2078-12-03 B.S (March 17, 2022 A.D).

b) The works for which tender have been invited and contracts accepted 2078-12-03 B.S (March 17, 2022 A.D) but the work acceptance report has been approved according to Rule 117 of PPR.

c) The works for which tenders were invited or contracts accepted under all types of foreign assistance.

Part – II

REQUIREMENTS

Table of Clauses

Section - V Works Requirements 46

Scope of Work
…….. 47

Specifications
……..... 48

Notes on the Specifications ……..... 48

Sample Clause: Equivalency of Standards and Codes ... .…….. 49

Drawings
……..…….. 50

Supplementary Information ... .……..... 51

Section - VI Bill of Quantities ... .…….... 52

Notes for Unit Rate Contracts.....…….. 52

Preamble of Bill of Quantities
…….. 53

Bill of Quantities 56

SECTION - V
Works Requirements

This Section contains the Scope of Work, Specification, the Drawings, and supplementary information that describe the Works to be procured.

Scope of Work

Supply and Laying of 150mm dia DI Pipe (Secondary Pipe) at Lalitpur Metropolitan City-02, from Heritage Garden to Kantihitti, Kalika Mandir

Specifications

Notes on the Specifications

A set of precise and clear specifications is a prerequisite for Bidders to respond realistically and competitively to the requirements of the Employer without qualifying or conditioning their Bids. The specifications must be drafted to permit the widest possible competition and, at the same time, present a clear statement of the required standards of workmanship, materials, and performance of the goods and services to be procured. Only if this is done will the objectives of economy, efficiency and fairness in procurement be realized, responsiveness of Bids be ensured, and the subsequent task of bid evaluation facilitated. The specifications should require that all goods and materials to be incorporated in the Works be new, unused, of the most recent or current models, and incorporate all recent improvements in design and materials unless provided otherwise in the Contract.
Samples of specifications from previous similar projects are useful in this respect. The use of metric units is encouraged by the Funding Agency in case of funding assisted projects. Most specifications are normally written specially by the Employer or Project Manager to suit the Contract Works in hand. The available standard specification of works of Ministry of Physical Infrastructure and Transport, DoLI and Other line Ministries can be adopted for respective civil construction works.
There are considerable advantages in standardizing General Specifications for repetitive Works in recognized public sectors, such as highways, urban housing, irrigation, and water supply, in the same country or region where similar conditions prevail. The General Specifications should cover all classes of workmanship, materials, and equipment commonly involved in construction, however it may not necessarily be adequate to be used in a particular Works Contract and may necessitate preparation of Particular (Special) Specifications to amend and or supplement the provision of the General Specifications to meet the requirement of the particular Works.

Care must be taken in drafting specifications to ensure that they are not restrictive. In the specification of standards for goods, materials, and workmanship, recognized international standards should be used as much as possible. Where other particular standards are used, whether national standards of Nepal or other standards, the specifications should state that goods, materials, and workmanship that meet other authoritative standards, and which ensure substantially equal or higher quality than the standards mentioned, will also be acceptable.

Employers should decide whether technical solutions to specified parts of the Works are to be permitted. Alternatives are appropriate in cases where obvious (and potentially less costly) alternatives are possible to the technical solutions indicated in the Procurement Documents for certain elements of the Works, taking into consideration the comparative specialized advantage of potential bidders. For example:

The Employer should provide a description of the selected parts of the Works with appropriate references to Drawings, Specifications, Bill of Quantities, and Design or Performance criteria, stating that the alternative solutions if applicable shall be at least structurally and functionally equivalent to the basic design parameters and specifications.

Such alternative solutions shall be accompanied by all information necessary for a complete evaluation by the Employer, including drawings, design calculations, technical specifications, breakdown of prices, proposed construction methodology, and other relevant details.

Sample Clause: Equivalency of Standards and Codes

Wherever reference is made in the Contract to specific standards and codes to be met by the goods and materials to be furnished, and work performed or tested, the provisions of the latest current edition or revision of the relevant standards and codes in effect shall apply, unless otherwise expressly stated in the Contract. Where such standards and codes are national, or relate to a particular country or region, other authoritative standards that ensure a substantially equal or higher quality than the standards and codes specified will be accepted subject to the Project Manager's prior review and written consent. Differences between the standards specified and the proposed alternative standards shall be fully described in writing by the Contractor and submitted to the Project Manager at least 30 days prior to the date when the Contractor desires the Project Manager's consent. In the event the Project Manager determines that such proposed deviations do not ensure substantially equal or higher quality, the Contractor shall comply with the standards specified in the documents. These Notes for Preparing Specifications are intended only as information for the Employer or the person drafting the Procurement Documents. They should not be included in the final documents.

Drawings

Note:

1. It is customary to bind the drawings in a separate volume, which is often larger than other volumes of the contract documents. The size will be dictated by the scale of the drawings, which must not be reduced to the extent that details are reduced illegible.

2. A simplified map showing the location of the Site in relation to the local geography, indicating major roads, posts, airports, and railroads, is helpful.

3. The construction drawings, even if not fully developed, must show sufficient details to enable bidders to understand the type and complexity of the work involved and the price the Bill of Quantities.

SECTION - VI

Bill of Quantities[6]

Notes for Unit Rate Contracts:

Objectives

The objectives of the Bill of Quantities are

(a) to provide sufficient information on the quantities of Works to be performed to enable Bids to be prepared efficiently and accurately; and

(b) when a Contract has been entered into, to provide a priced Bill of Quantities for use in the periodic valuation of Works executed.

In order to attain these objectives, Works should be itemized in the Bill of Quantities in sufficient detail to distinguish between the different classes of Works, or between Works of the same nature carried out in different locations or in other circumstances which may give rise to different considerations of cost. Consistent with these requirements, the layout and content of the Bill of Quantities should be as simple and brief as possible.

Content

The Bill of Quantities should be divided generally into the following sections:

(a) Preamble;

(b) Work Items (grouped into parts);

(c) Day works Schedule;

d) Provisional Sums; and

(d) Summary.

Preamble

The Preamble should indicate the inclusiveness of the unit prices, and should state the methods of measurement which have been adopted in the preparation of the Bill of Quantities and which are to be used for the measurement of any part of the works.

Work Items

The items in the Bill of Quantities should be grouped into sections to distinguish between those parts of the Works which by nature, location, access, timing, or any other special characteristics may give rise to different methods of construction, or phasing of the Works, or considerations of cost. General items common to all parts of the works may be grouped as a separate section in the Bill of Quantities.

Day work Schedule

A Day work Schedule should be included only if the probability of unforeseen work, outside the items included in the Bill of Quantities, is high. To facilitate checking by the Employer of the realism of rates quoted by the Bidders, the Day work Schedule should normally comprise the following:

(a) A list of the various classes of labour, materials, and Constructional Plant for which basic day work rates or prices are to be inserted by the Bidder, together with a statement of the conditions under which the Contractor will be paid for work executed on a day work basis.

(b) Nominal quantities for each item of Day work, to be priced by each Bidder at Day work rates as bid. The rate to be entered by the Bidder against each basic Day work item should include the Contractor's profit, overheads, supervision, and other charges.

[6]In lump sum contracts, delete "Bill of Quantities" and replace with "Schedule of Activities" throughout this section.

Provisional Sums
A general provision for physical contingencies (quantity overruns) may be made by including a provisional sum in the Summary Bill of Quantities. Similarly, a contingency allowance for possible price increases should be provided as a provisional sum in the Summary Bill of Quantities. The inclusion of such provisional sums often facilitates budgetary approval by avoiding the need to request periodic supplementary approvals as the future need arises. Where such provisional sums or contingency allowances are used, the Contract Data should state the manner in which they will be used, and under whose authority (usually the Project Manager's).

Summary
The Summary should contain a tabulation of the separate parts of the Bill of Quantities carried forward, with provisional sums for Day work, for physical (quantity) contingencies, and for price contingencies (upward price adjustment) where applicable.

These Notes for Preparing Specifications are intended only as information for the Employer or the person drafting the Bidding documents. They should not be included in the final documents.

Preamble of Bill of Quantities

A. General

1. The Bill of Quantities shall be read in conjunction with the Instructions to Bidders, General and Special Conditions of Contract, Technical Specifications, and Drawings.

2. The quantities given in the Bill of Quantities are estimated and provisional, and are given to provide a common basis for bidding. The basis of payment will be the actual quantities of work ordered and carried out, as measured by the Contractor and verified by the Project Manager and valued at the rates and prices bid in the priced Bill of Quantities, where applicable, and otherwise at such rates and prices as the Project Manager may fix within the terms of the Contract.

3. For any item for which measurement is based on records made before or during construction the records shall be prepared and agreed between the Engineer and the Contractor. Should the Contractor carry out such work without the prior agreement of the Engineer, the Engineer may request the Contractor to carry out investigations to confirm the extent of the work and the quantity of work certified for payment shall be solely at the Engineer's discretion. The cost of any such investigation shall be borne by the Contractor.

4. The rates and prices bid in the priced Bill of Quantities shall, except as otherwise provided under the Contract, include all construction equipment, labor, supervision, materials, erection, maintenance, insurance, profit, taxes, and duties, together with all general risks, liabilities, and obligations set out or implied in the Contract.

5. A rate or price shall be entered against each item in the priced Bill of Quantities, whether quantities are stated or not. The cost of items against which the Contractor has failed to enter a rate or price shall be deemed to be covered by other rates and prices entered in the Bill of Quantities.

6. The whole cost of complying with the provisions of the Contract shall be included in the Items provided in the priced Bill of Quantities, and where no Items are provided, the cost shall be deemed to be distributed among the rates and prices entered for the related Items of Work.

7. General directions and descriptions of work and materials are not necessarily repeated nor

summarized in the Bill of Quantities. References to the relevant sections of the Contract documentation shall be made before entering prices against each item in the priced Bill of Quantities. The Specification Clause references, where given in the item description of the Bills of Quantities, are for the convenience of bidders and generally refer to the principal relevant-specification clause but do not necessarily represent the whole of the specification requirements for the work required within the item. The presence of a Specification clause reference shall not in any way reduce the Bidders obligation to complete work in accordance with all the requirements of the Specification.

8. Provisional Sums included and so designated in the Bill of Quantities shall be expended in whole or in part at the direction and discretion of the Project Manager in accordance with the Conditions of Contract.

9. The method of measurement of completed work for payment shall be in accordance with the Specifications.

10. The abbreviations and symbols used in this Bill of Quantities are: ***[Insert as applicable]***

B. Day work Schedule

a) **General**

1. Work shall not be executed on a day work basis except by written order of the Project Manager. Bidders shall enter basic rates for day work items in the Schedules. These rates shall apply to any quantity of day work ordered by the Project Manager. Nominal quantities have been indicated against each item of day work, and the extended total for day work shall, be carried forward as a Provisional Sum to the Summary Total Bid Amount. Unless otherwise adjusted, payments for day work shall be subject to price adjustment in accordance with the provisions in the Conditions of Contract.

b) Day work Labor

1. In calculating payments due to the Contractor for the execution of day works, the hours for labor will be reckoned from the time of arrival of the labor at the job site to execute the particular item of day work to the time of departure from the job site, but excluding meal breaks and rest periods. Only the time of classes of labor directly doing work ordered by the Project Manager and are competent to perform such work will be measured. The time of gangers (charge hands) actually doing work with the gangs will also be measured but not the time of foremen or other supervisory personnel.
2. The Contractor shall be entitled to payment in respect of the total time that labor is employed on day work, calculated at the basis rates entered by it in the " SCHEDULE OF DAY WORK RATES: 1. LABOR". The rates for labor shall be deemed to cover all costs to the Contractor including (but not limited to) i) the amount of wages paid to such labor, transportation time, overtime, subsistence allowances, ii) any sums paid to or on behalf of such labor for social benefits in accordance with Nepal law, iii) Contractor's profit, overheads, superintendence, liabilities and insurance and iv) charges incidental to the foregoing.

c) Day work Equipment

1. The Contractor shall be entitled to payments in respect of Constructional Plant already on site and employed on day work at the basis rental rates entered by him in the “SCHEDULE OF DAY WORK RATES:2 EQUIPMENT”. The said rates shall be deemed to include due and complete allowance for depreciation, interest, indemnity and insurance, repairs, maintenance, supplies, fuel, lubricant, and other consumables and all overhead, profit and administrative costs related to the use of such equipment. The cost of drivers, operators and assistants also shall be included in the rate of the equipment and no separately payment shall be made for it.
2. In calculating the payment due to the Contractor for Constructional Plant employed on day work, only

the actual number of working hours will be eligible for payment, except that where applicable and agreed with the Project Manager, the travelling time from the part of the Site where the Construction Plant was located when ordered by the Project Manager to be employed on day work and the time for return journey there to shall be included for payment.

d) Day work Materials

1. The Contractor shall be entitled to payment in respect of materials used for day work (except for materials for which the cost is included in the percentage addition to labor costs as detailed heretofore), at the rates entered by him in the "SCHEDULE OF DAY WORK RATES: 3 MATERIALS" and shall be deemed to include overhead charges and profit as follows;

   (i) the rates for materials shall be calculated on the basis of the invoiced price, freight, insurance, handling expenses, damage, losses, etc. and shall provide for delivery to store for stockpiling at the Site.

   (ii) the cost of hauling materials for use on work ordered to be carried out as day work, from the store or stockpile on the Site to the place where it is to be used also shall be include in the same rate.

Provisional Sums

The estimated cost of specialized work to be carried out, or of special goods to be supplied, by other contractors should be indicated in the relevant part of the Bill of Quantities as a particular provisional sum with an appropriate brief description. A separate procurement procedure is normally carried out by the Employer to select such specialized contractors. To provide an element of competition among the Bidders in respect of any facilities, amenities, attendance, etc., to be provided by the successful Bidder as prime Contractor for the use and convenience of the specialist contractors, each related provisional sum should be followed by an item in the Bill of Quantities inviting the Bidder to quote a sum for such amenities, facilities, attendance, etc.

PART-III CONDITIONS OF CONTRACT AND CONTRACT FORMS

Table of Clauses

General **54**

1. Definitions 54
2. Interpretation 56
3. Language and Law 56
4.Contract Agreement 56
5. Assignment 57
6. Care and Supply of Documents 57
7. Confidential Details 57
8. Compliance with Laws 57
9. Joint and Several Liability 58
10. Project Manager's Decisions 58
11. Delegation 58
12. Communications 58
13. Subcontracting 58
14. Other Contractors 59
15 Personnel and Equipment 59
16. Employer's and Contractor's Risk 60
17. Employer's Risks 60
18. Contractor's Risks 60
19. Insurance 60
20. Site Investigation Reports 61
21. Contractor to Construct the Works 61
22. The Works to Be Completed within intended Completion Date 61
23. Design by contractor and Approval by the Project Manager 61
24. Safety, Security and Protection of the Environment 61
25. Discoveries 62
26. Possession of the Site 62
27. Access to the Site 62
28.Instructions, Inspections and Audits 62
29.Dispute Settlement 63
30. Procedures for Disputes 63

B. Staff and Labor **63**

31. Forced Labor 63
32. Child Labor 63
33.Non-discrimination and Equal Opportunity 63

B1. Time Control **63**

34. Program 63
35. Extension of the Intended Completion Date 64
36. Acceleration 64
37. Delays Ordered by the Project Manager 65
38.Management Meetings 65
39. Early Warning 65

C. Quality Control **65**

40. Identifying Defects 65
41. Tests 65
42.Correction of Defects 65
43.Uncorrected Defects 65

D. Cost Control **66**

44. Contract Price 66
45. Changes in the Contract Price 66
46. Variations 66
47.Cash Flow Forecasts 67
48.Payment Certificates 67
49. Payments 67
50.Compensation Events 68
51. Tax 69
52. Currency 69
53.Price Adjustment 69
54. Retention 70
55.Liquidated Damages 71
56. Bonus 71
57.Advance Payment 71
58. Securities 72
59. Day works 72
60. Cost of Repairs 72
F. Force Majeure 73
61.Definition of Force Majeure 73
62. Notice of Force Majeure 73
63. Duty to Minimize Delay 73
64. Consequences of Force Majeure 74
65. Force Majeure Affecting Subcontractor 74
66.Optional Termination, Payment and Release 74
67. Release from Performance 75
G. Finishing the Contract 75
68. Completion 75
69. Taking Over 75
70. Final Account 76
71. Operating and Maintenance Manuals 76
72. Termination 76
73.Fraud and Corruption 77
74. Black Listing 78
75. Payment upon Termination 78
76. Property 79
77.Release from Performance 79
78. Suspension of DP Loan/Credit/Grant 79
79. Eligibility 79
80.ProjectManager's Duties and Authorities 80
81.Quarries and Spoil Dumps 80
82. Local Taxation 80
83. Value Added Tax 80
84. Income Taxes on Staff 80
85. Duties, Taxes and Royalties 80
86. Member of Government, etc, not Personally Liable 81
87. Approval of Use of Explosives 81
89. Permission for Blasting 81
90.Records of Explosives 81
91. Traffic Diversion 81
92. Social Security
Fund……..……..91

Section VII: General Conditions of Contract

Kathmandu Upatyaka Khanepani Limited, Lalitpur Branch Office

Supply and Laying of 150mm dia DI Pipe (Secondary Pipe) at Lalitpur Metropolitan City-02, from Heritage Garden to Kantihitti, Kalika Mandir

Invitation for Bids No.: KUKL.LTR/NCB-11/083/084

General Conditions of Contract

This Section provides the General Conditions of Contract that will apply to the Contract for which the Biding document is issued.

General	
1. Definitions	1.1 Boldface type is used to identify defined terms. (a) The **Accepted Contract Amount** means the amount accepted in the Letter of Acceptance for the execution and completion of the Works and the remedying of any defects. (b) The **Activity Schedule** is a schedule of the activities comprising the construction, installation, testing, and commissioning of the Works in a lump sum contract. It includes a lump sum price for each activity, which is used for valuations and for assessing the effects of Variations and Compensation Events. (c) **Bill of Quantities** means the priced and completed Bill of Quantities forming part of the Bid. (d) **Compensation Events** are those defined in GCC 50 hereunder. (e) The **Completion Date** is the date of completion of the Works as certified by the Project Manager, in accordance with GCC 68.1. (f) The **Contract** is the Contract between the Employer and the Contractor to execute, complete, and maintain the Works. It consists of the documents listed in GCC 2.3 below. (g)The **Contractor** is the party whose Bid to carry out the Works has been accepted by the Employer. (h)The **Contractor's Bid** is the completed bidding document submitted by the Contractor to the Employer. (i)The **Contract Price** is the Accepted Contract Amount stated in the Letter of Acceptance and thereafter as adjusted in accordance with the Contract. (j) **Days** are calendar days; months are calendar-months. (k) **Dayworks** are varied work inputs subject to payment on a time basis for the Contractor's employees and Equipment, in addition to payments for associated Materials and Plant. (l) A **Defect** is any part of the Works not completed in accordance with the Contract. (m) The **Defects Liability Certificate** is the certificate issued by Project Manager upon correction of defects by the Contractor. (n) The **Defects Liability Period** is the period calculated from the Completion Date where the Contractor remains responsible for remedying defects. (o) **Drawings** include calculations and other information provided or approved

	by the Project Manager for the execution of the Contract. (p) The **Employer** is the party who employs the Contractor to carry out the Works, as **specified in the SCC**. (q) **Equipment** is the Contractor's machinery and vehicles brought temporarily to the Site to construct the Works. (r) **Force Majeure** means an exceptional event or circumstance: which is beyond a Party's control; which such Party could not reasonably have provided against before entering into the Contract; which, having arisen, such Party could not reasonably have avoided or overcome; and, which is not substantially attributable to the other Party. (s) The **Initial Contract Price** is the Contract Price listed in the Employer's Letter of Acceptance. (t) **In writing** or **written** means hand written, type written, printed or electronically made, and resulting in permanent record. (u) The **Intended Completion Date** is the date on which it is intended that the Contractor shall complete the Works. The Intended Completion Date is **specified in the SCC**. The Intended Completion Date may be revised only by the Project Manager by issuing an extension of time or an acceleration order. (v) **Letter of Acceptance** means formal acceptance by the Employer of the Bid and denotes the formation of the contract at the date of acceptance. (w) **Materials** are all supplies, including consumables, used by the Contractor for incorporation in the Works. (x) **Party** means the Employer or the Contractor, as the context requires. (y) **SCC** means Special Conditions of Contract (aa) **Plant** is any integral part of the Works that shall have a mechanical, electrical, chemical, or biological function. (bb) The **Project Manager** is the person **named in the SCC** (or any other competent person appointed by the Employer and notified to the Contractor, to act in replacement of the Project Manager) who is responsible for supervising the execution of the Works and administering the Contract. (cc) **Retention Money** means the aggregate of all monies retained by the Employer pursuant to GCC 54.1. (dd) **Schedules** means the document(s) entitled schedules, completed by the Contractor and submitted with the Letter of Bids, as included in the Contract. Such document may include the Bill of Quantities, data, lists, and schedules of rates and/or prices. (ee) The **Site** is the area defined **as such in the SCC.** (ff) **Site Investigation Reports** are those that were included in the bidding documents and are factual and interpretative reports about the surface and subsurface conditions at the Site. (gg) **Specification** means the Specification of the Works included in the Contract and any modification or addition made or approved by the Project Manager. (hh) The **Start Date** is given i**n the SCC**. It is the latest date when the Contractor shall commence execution of the Works. It does not necessarily coincide with any of the Site Possession Dates. (ii) A **Subcontractor** is a person or corporate body who has a Contract with the Contractor to carry out a part of the work in the Contract, which includes work on the Site. (jj) **Temporary Works** are works designed, constructed, installed, and

	removed by the Contractor that are needed for construction or installation of the Works. (kk) A **Variation** is an instruction given by the Project Manager which varies the Works (ll) The **Works** are what the Contract requires the Contractor to construct, install, and turn over to the Employer, as **defined in the SCC**.
2. Interpretation	2.1 In interpreting these GCC, singular also means plural, male also means female or neuter, and the other way around. Headings have no significance. Words have their normal meaning under the language of the Contract unless specifically defined. The Project Manager shall provide instructions clarifying queries about these GCC.
	2.2 If sectional completion is **specified in the SCC**, references in the GCC to the Works, the Completion Date, and the Intended Completion Date apply to any Section of the Works (other than references to the Completion Date and Intended Completion Date for the whole of the Works).
	2.3 The documents forming the Contract shall be interpreted in the following order of priority: (a) Contract Agreement, (b) Letter of Acceptance, (c) Letter of Bid, (d) Special Conditions of Contract, (e) General Conditions of Contract, (f) Specifications, (g) Drawings, (h) Bill of Quantities (or Schedules of Prices for lump sum contracts), and (i) Any other document **listed in the SCC** as forming part of the Contract.
3. Language and Law	3.1 The language of the Contract and the law governing the Contract are **stated in the SCC**.
	3.2 Throughout the execution of the Contract, the Contractor shall comply with the import of goods and services prohibitions in the Employer's country when (a) by an act of compliance with a decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations, the Employer's Country prohibits any import of goods from, or any payments to, a particular country, person, or entity. Where the Employer's country prohibits payments to a particular firm or for particular goods by such an act of compliance, that firm may be excluded.
4.Contract Agreement	4.1 The Parties shall enter into a Contract Agreement within 15 days after the Contractor receives the Letter of Acceptance, unless the Special Conditions establish otherwise. The Contract Agreement shall be based upon the attached Contract forms in Section IX.
	4.2 Without altering the basic nature or scope of work, the contract may be

	amended upon mutual written consent as per prevailing Public Procurement Law.
5. Assignment	5.1 Neither Party shall assign the whole or any part of the Contract or any benefit or interest in or under the Contract. However, either Party (a) may assign the whole or any part with the prior agreement of the other Party, at the sole discretion of such other Party; and (b) may, as security in favor of a bank or financial institution, assign its right to any moneys due, or to become due, under the Contract.
6. Care and Supply of Documents	6.1 The Specification and Drawings shall be in the custody and care of the Employer. Unless otherwise stated in the Contract, one copy of the Contract and of each subsequent Drawing shall be supplied to the Contractor, who may make or request further copies at the cost of the Contractor.
	6.2 Each of the Contractor's Documents shall be in the custody and care of the Contractor, unless and until taken over by the Employer. Unless otherwise stated in the Contract, the Contractor shall supply to the Engineer six copies of each of the Contractor's Documents.
	6.3 The Contractor shall keep, on the Site, a copy of the Contract, publications named in the Specification, the Contractor's Documents (if any), the Drawings and Variations and other communications given under the Contract. The Employer's Personnel shall have the right of access to all these documents at all reasonable times.
	6.4 If a Party becomes aware of an error or defect in a document which was prepared for use in executing the Works, the Party shall promptly give notice to the other Party of such error or defect.
7. Confidential Details	7.1 The Contractor's and the Employer's Personnel shall disclose all such confidential and other information as may be reasonably required in order to verify the Contractor's compliance with the Contract and allow its proper implementation.
	7.2 Each of them shall treat the details of the Contract as private and confidential, except to the extent necessary to carry out their respective obligations under the Contract or to comply with applicable Laws. Each of them shall not publish or disclose any particulars of the Works prepared by the other Party without the previous agreement of the other Party. However, the Contractor shall be permitted to disclose any publicly available information, or information otherwise required to establish his qualifications to compete for other projects.
	7.3 Notwithstanding the above, the Contractor may furnish to its Subcontractor(s) such documents, data and other information it receives from the Employer to the extent required for the Subcontractor(s) to perform its work under the Contract, in which event the Contractor shall obtain from such Subcontractor(s) an undertaking of confidentiality similar to that imposed on the Contractor under this Clause.
8. Compliance	8.1 The Contractor shall, in performing the Contract, comply with applicable Laws

with Laws	of Nepal.
9. Joint and Several Liability	9.1 If the Contractor is a joint venture of two or more entities, all such entities shall be jointly and severally liable to the Employer for the fulfillment of the provisions of the Contract and shall designate one of such persons to act as a leader with authority to bind the joint venture. **The contractor shall not hand over the responsibility of the contract to any one member or some members of Joint Venture or any other parties not involved in the contract.** The composition or the constitution of the joint venture shall not be altered without the prior consent of the Employer.
10. Project Manager's Decisions	10.1 Except where otherwise specifically stated, the Project Manager shall decide contractual matters between the Employer and the Contractor in the role representing the Employer.
11. Delegation	11.1 The Project Manager may delegate any of his duties and responsibilities to other people after notifying the Contractor and may cancel any delegation after notifying the Contractor.
12. Communications	12.1 Communications between parties that are referred to in the Conditions shall be effective only when in writing. Wherever these Conditions provide for the giving or issuing of approvals, certificates, consents, determinations, notices and requests, these communications shall be: (a) in writing and delivered by hand (against receipt), sent by mail or courier, or transmitted using any of the agreed systems of electronic transmission as **stated in the SCC**; and (b) delivered, sent or transmitted to the address for the recipient's communications as stated in the Contract. However: (i) if the recipient gives notice of another address, communications shall thereafter be delivered accordingly; and (ii) if the recipient has not stated otherwise when requesting an approval or consent, it may be sent to the address from which the request was issued. Approvals, certificates, consents and determinations shall not be unreasonably withheld or delayed.
	12.2 A Notice shall be effective when delivered or on the Notice's effective date, whichever is later.
13. Subcontracting	13.1 **For GON Funded:** A list of approved Subcontractors including its value/works is included as Article 2 (k) of contract Agreement. Approval by the Employer for any of the Subcontractors shall not relieve the Contractor from any of its obligations, duties, or responsibilities under the contract. **For DP Funded:** The Contractor may subcontract with the approval of the Project Manager but may not assign the Contract without the approval of the Employer in writing. Subcontracting shall not alter the Contractor's obligations. Bidders may propose subcontracting up to the percentage of total value of contracts as specified in the SCC. The Subcontractor shall meet the qualification requirement as specified **in SCC.**

	13.2 The contractor shall give prior notice to the Employer clearly specifying the nature, scope, and responsibilities of the work to be performed, to engage other subcontractors, material suppliers, equipment suppliers, service providers, or other persons or entities during the implementation of the contract. 13.3 Before notifying the Employer as per GCC 13.2, the contractor shall enter into a written agreement with the subcontractor, material suppliers, equipment suppliers, service providers, or other persons or entities clearly specifying the scope of work, responsibilities, quality requirements, duration, payment terms, security, labor-related obligations, and conditions relating to performance of the work. 13.3 Any subcontracting arrangement made in accordance with GCC 13.2 shall not relieve the Contractor of any of its obligations or liabilities under the Contract. 13.4 The contractor shall provide the Employer with details of the payments made to the subcontractor, material suppliers, equipment suppliers, service providers, or other persons or entities engaged under GCC 13.1 and/or GCC 13.2. 13.5 If the contractor is found not to have made payment to the subcontractor, material suppliers, equipment suppliers, service providers, or other persons or entities engaged under GCC 13.1 and/or GCC 13.2 in accordance with the terms of the agreement, the Employer may determine the amount payable to such subcontractor, material suppliers, equipment suppliers, service providers, or other persons or entities and make payment to them from any remaining dues to be paid to the contractor, retention money, or forfeited performance security.
14. Other Contractors	14.1 The Contractor shall cooperate and share the Site with other contractors, public authorities, utilities, and the Employer between the dates given in the Schedule of Other Contractors, **as referred to in the SCC**. The Contractor shall also provide facilities and services for them as described in the Schedule. The Employer may modify the Schedule of Other Contractors, and shall notify the Contractor of any such modification
15 Personnel and Equipment	15.1 The Contractor shall employ the key personnel and use the equipment identified in its Bid to carry out the Works, or other personnel and equipment approved by the Project Manager. The Project Manager shall approve any proposed replacement of key personnel and equipment only if their relevant qualifications or characteristics are substantially equal to or better than those proposed in the Bid.
	15.2 If the Project Manager asks the Contractor to remove a person who is a member of the Contractor's staff or work force, stating the reasons, the Contractor shall ensure that the person leaves the Site within seven days and has no further connection with the work in the Contract.
	15.3 If the Employer, Project Manager, or Contractor determines, that any employee of the Contractor be determined to have engaged in corrupt, fraudulent, collusive, coercive, or other prohibited practices during the execution of the Works, then that employee shall be removed in accordance with Clause 15.2 above.

16. Employer's and Contractor's Risk	16.1 The Employer carries the risks which this Contract states are Employer's risks, and the Contractor carries the risks which this Contract states are Contractor's risks.
17. Employer's Risks	17.1 From the Start Date until the Defects Liability Certificate has been issued, the following are Employer's risks: (a) The risk of personal injury, death, or loss of or damage to property (excluding the Works, Plant, Materials, and Equipment), which are due to (i) use or occupation of the Site by the Works or for the purpose of the Works, which is the unavoidable result of the Works or (ii) negligence, breach of statutory duty, or interference with any legal right by the Employer or by any person employed by or contracted to him except the Contractor. (b) The risk of damage to the Works, Plant, Materials, and Equipment to the extent that it is due to a fault of the Employer or in the Employer's design, or due to war or radioactive contamination directly affecting the country where the Works are to be executed.
	17.2 From the Completion Date until the Defects Liability Certificate has been issued, the risk of loss of or damage to the Works, Plant, and Materials is an Employer's risk except loss or damage due to (a) a Defect which existed on the Completion Date, (b) an event occurring before the Completion Date, which was not itself an Employer's risk, or (c) the activities of the Contractor on the Site after the Completion Date.
18. Contractor's Risks	18.1 From the Starting Date until the Defects Liability Certificate has been issued, the risks of personal injury, death, and loss of or damage to property (including, without limitation, the Works, Plant, Materials, and Equipment) which are not Employer's risks are Contractor's risks.
19. Insurance	19.1 The Contractor shall provide insurance in the joint names of the Employer and the Contractor from the Start Date to the end of the Defects Liability Period, in the amounts and deductibles **stated in the SCC** for the following events which are due to the Contractor's risks: (a) loss of or damage to the Works, Plant, and Materials; (b) loss of or damage to Equipment; (c) loss of or damage to property (except the Works, Plant, Materials, and Equipment) in connection with the Contract; and (d) Personal injury or death.
	19.2 Policies and certificates for insurance shall be delivered by the Contractor to the Project Manager for the Project Manager's approval before the Start Date. All such insurance shall provide for compensation to be payable in the proportions of Nepalese Rupees required to rectify the loss or damage incurred.

	19.3 If the Contractor does not provide any of the policies and certificates required, the Employer may affect the insurance which the Contractor should have provided and recover the premiums the Employer has paid from payments otherwise due to the Contractor or, if no payment is due, the payment of the premiums shall be a debt due.
	19.4 Alterations to the terms of insurance shall not be made without the approval of the Project Manager.
	19.5 Both parties shall comply with the conditions of the insurance policies.
20. Site Investigation Reports	20.1 The Contractor, in preparing the Bid, shall rely on any Site Investigation Reports referred to **in the SCC**, supplemented by any information available to the Contractor.
21. Contractor to Construct the Works	21.1 The Contractor shall construct and install the Works in accordance with the Specifications and Drawings.
22. The Works to Be Completed within intended Completion Date	22.1 The Contractor may commence execution of the Works on the Start Date and shall carry out the Works in accordance with the Program submitted by the Contractor, as updated with the approval of the Project Manager, and complete them within the intended Completion Date.
23. Design by contractor and Approval by the Project Manager	23.1 The contractor shall be responsible for the design of permanent works as **specified in SCC**.
	23.2 Contractor shall be responsible for design of the Temporary Works. The Contractor shall submit Specifications and Drawings showing the proposed Temporary Works to the Project Manager, for his approval.
	23.3 All Drawings prepared by the Contractor for the execution of the temporary or permanent Works, shall be subject to prior approval by the Project Manager before their use.
	23.4 The Project Manager's approval shall not alter the Contractor's responsibility for design of temporary works.
24. Safety, Security and Protection of the Environment	24.1 The Contractor shall, throughout the execution, and completion of the works and remedying of any defects therein: a. Have full regard for the safety of all persons entitled to be upon the site and keep the site (so as the same is under his control) and the works (so far as the same are not completed or occupied by the Employer) in an orderly state appropriate to the avoidance of danger to such persons. b. Provide and maintain at his own cost all lights, guards, fencing, warning signs and watching, when necessary or required by the Project Manager or by any duly constituted authority, for the protection of the Works of for the safety

	and convenience of the public or others. c. Take all reasonable steps to protect the environment on and off the site and to avoid damage or nuisance to persons or to property of the public or others resulting from pollution, noise or other causes arising as a consequence of his methods of operation. d. Ensure that any cut or fill slopes are planted in grass or other plant cover as soon as possible to protect them from erosion. e. Any spoil or material removed from drains shall be disposed of to designated stable tipping areas as directed by the Project Manager. f. Shall not use fuel wood as a means of heating during the processing or preparation of any materials forming part of the works. g. The Project Manager shall have the power to disallow any working practice or activity of the Contractor or direct that such practices or activities be modified should the Project Manager consider, on the advice of the relevant Government Departments, that the practices or activities will be harmful to wildlife. h. Provide on the Site such lifesaving apparatus as may be appropriate and an adequate and easily accessible first aid outfit or such outfits as may be required by any government ordinance, factory act, etc., subsequently published and amended from time to time.
	24.2 The Contractor shall comply with the Employer's Occupational Health and Safety (OHS) Policy, Guideline and/or Operating Manual, if any, **as specified in the SCC.**
25. Discoveries	25.1 Anything of historical or other interest or of significant value unexpectedly discovered on the Site shall be the property of the employer. The Contractor shall notify the Project Manager of such discoveries and carry out the Project Manager's instructions for dealing with them.
26. Possession of the Site	26.1 The Employer shall give possession of all parts of the Site to the Contractor. If possession of a part is not given by the date **stated in the SCC**, the Employer shall be deemed to have delayed the start of the relevant activities, and this shall be a Compensation Event.
27. Access to the Site	27.1 The Contractor shall allow the Project Manager and any person authorized by the Project Manager access to the Site and to any place where work in connection with the Contract is being carried out or is intended to be carried out.
28.Instructions, Inspections and Audits	28.1 The Contractor shall carry out all instructions of the Project Manager which comply with the applicable laws where the Site is located.
	28.2 The Contractor shall keep and shall make all reasonable efforts to cause its Subcontractors and sub consultants to keep accurate and systematic accounts and records in respect of the Works in such form and details as will clearly identify relevant time changes and costs.
	28.3 The Contractor shall permit the GoN/DP and/or persons appointed by the GoN/DP to inspect the Site and/or the accounts and records of the Contractor and its sub-contractors relating to the performance of the Contract, and to have such accounts and records audited by auditors appointed by the GoN/DP if

	required by the GoN/DP. The Contractor's attention is drawn to Sub-Clause 73.2 which provides, inter alia, that acts intended to materially impede the exercise of the GoN's/DP's inspection and audit rights provided for under this Sub-Clause constitute a obstructive practice subject to contract termination.
29.Dispute Settlement	29.1 The Employer and the Contractor shall attempt to settle amicably by direct negotiation any disagreement or dispute arising between them under or in connection with the Contract.
	29.2 Any dispute between the Parties as to matters arising pursuant to this Contract which cannot be settled amicably within thirty (30) days after receipt by one Party of the other Party 's request for such amicable settlement may be referred to Arbitration within 30 days after the expiration of amicable settlement period.
30. Procedures for Disputes	30.1 In case of arbitration, the arbitration shall be conducted in accordance with procedures in accordance with law of Nepal at the place **given in the SCC**.
B. Staff and Labor	
31. Forced Labor	31.1 The Contractor shall not employ forced labor, which consists of any work or service, not voluntarily performed, that is exacted from an individual under threat of force or penalty. This covers any kind of involuntary or compulsory labor, such as indentured labor, bonded labor, or similar labor–contracting arrangements.
32. Child Labor	32.1 The Contractor shall not employ children in a manner that is economically exploitative, or is likely to be hazardous, or to interfere with, the child's education, or to be harmful to the child's health or physical, mental, spiritual, moral, or social development. Where national laws have provisions for employment of minors, the Contractor shall follow those laws applicable to the Contractor. Children below the age of 18 shall not be employed in dangerous work.
33.Non-discrimination and Equal Opportunity	33.1 The Contractor shall not make employment decisions based on personal characteristics unrelated to inherent job requirements. The Contractor shall base the employment relationship on the principle of equal opportunity and fair treatment and shall not discriminate with respect to aspects of the employment relationship, including recruitment and hiring, compensation (including wages and benefits), working conditions and terms of employment, access to training, promotion, termination of employment or retirement, and discipline. In countries where national law provides for non-discrimination in employment, the Contractor shall comply with national law. When national laws are silent on nondiscrimination in employment, the Contractor shall meet this Sub clause's requirements. Special measures of protection or assistance to remedy past discrimination or selection for a particular job based on the inherent requirements of the job shall not be deemed discrimination.
B1. Time Control	
34. Program	34.1 Within the time **stated in the SCC**, after the date of the Letter of Acceptance, the Contractor shall submit to the Project Manager for approval a Program showing the general methods, arrangements, order, and timing for all the activities in the Works. In the case of a lump sum contract, the activities in the Program shall be consistent with those in the Activity Schedule.
	34.2 An update of the Program shall be a program showing the actual progress

	achieved on each activity and the effect of the progress achieved on the timing of the remaining work, including any changes to the sequence of the activities.
	34.3 The Contractor shall submit to the Project Manager for approval an updated Program at intervals no longer than the period **stated in the SCC**. If the Contractor does not submit an updated Program within this period, the Project Manager may withhold the amount stated in the SCC from the next payment certificate and continue to withhold this amount until the next payment after the date on which the overdue Program has been submitted. In the case of a lump sum contract, the Contractor shall Provide an updated Activity Schedule within 15 days of being instructed to by the Project Manager.
	34.4 The Project Manager's approval of the Program shall not alter the Contractor's obligations. The Contractor may revise the Program and submit it to the Project Manager again at any time. A revised Program shall show the effect of Variations and Compensation Events.
35. Extension of the Intended Completion Date	35.1 The Project Manager shall extend the Intended Completion Date if a Compensation Event occurs or a Variation is issued which makes it impossible for Completion to be achieved by the Intended Completion Date without the Contractor taking steps to accelerate the remaining work, which would cause the Contractor to incur additional cost.
	35.2 The Project Manager shall decide whether and by how much to extend the Intended Completion Date within 21 days of the Contractor asking the Project Manager for a decision upon the effect of a Compensation Event or Variation and submitting full supporting information at least 21 days prior to the intended completion date. If the Contractor has failed to give early warning of a delay or has failed to cooperate in dealing with a delay, the delay by this failure shall not be considered in assessing the new Intended Completion Date. Along with full supporting information, the contractor shall also submit a revised work schedule and ensure that the Performance Security, Insurance, and Advance Payment Security remain valid. Within fifteen (15) days of the receipt of Letter of Extension of Intended Completion Date from the Employer, the contractor shall submit Performance Security, Advanced Payment Guarantee (if any) and Insurance Policy documents as required with extended validity.
	35.3 If the contractor fails to submit Performance Security, Advanced Payment Guarantee (if any) and Insurance Policy documents, as required with extended validity within the prescribed time as per ITB 35.2, the Contractor shall pay fine at the rate of 0.01% of the final contract price (without VAT but including PS) per day for a maximum of fifteen (15) days. The Employer may deduct the fine from payments due to the Contractor.
36. Acceleration	36.1 When the Employer wants the Contractor to finish before the Intended Completion Date, the Project Manager shall obtain priced proposals for achieving the necessary acceleration from the Contractor. If the Employer accepts these proposals, the Intended Completion Date shall be adjusted accordingly and confirmed by both the Employer and the Contractor.
	36.2 If the Contractor's priced proposals for acceleration are accepted by the Employer, they are incorporated in the Contract Price and treated as a Variation.

37. Delays Ordered by the Project Manager	37.1 The Project Manager may instruct the Contractor to delay the start or progress of any activity within the Works.
38.Management Meetings	38.1 Either the Project Manager or the Contractor may require the other to attend a management meeting. The business of a management meeting shall be to review the plans for remaining work and to deal with matters raised in accordance with the early warning procedure.
	38.2 The Project Manager shall record the business of management meetings and provide copies of the record to those attending the meeting and to the Employer. The responsibility of the parties for actions to be taken shall be decided by the Project Manager either at the management meeting or after the management meeting and stated in writing to all who attended the meeting.
39. Early Warning	39.1 The Contractor shall warn the Project Manager at the earliest opportunity of specific likely future events or circumstances that may adversely affect the quality of the work, increase the Contract Price, or delay the execution of the Works. The Project Manager may require the Contractor to provide an estimate of the expected effect of the future event or circumstance on the Contract Price and Completion Date. The estimate shall be provided by the Contractor as soon as reasonably possible.
	39.2 The Contractor shall cooperate with the Project Manager in making and considering proposals for how the effect of such an event or circumstance can be avoided or reduced by anyone involved in the work and in carrying out any resulting instruction of the Project Manager.
C. Quality Control	
40. Identifying Defects	40.1 The Project Manager shall check the Contractor's work and notify the Contractor of any Defects that are found. Such checking shall not affect the Contractor's responsibilities. The Project Manager may instruct the Contractor to search for a Defect and to uncover and test any work that the Project Manager considers may have a Defect.
41. Tests	41.1 If the Project Manager instructs the Contractor to carry out a test not specified in the Specification to check whether any work has a Defect and the test shows that it does, the Contractor shall pay for the test and any samples. If there is no Defect, the test shall be a Compensation Event.
42.Correction of Defects	42.1 The Project Manager shall give notice to the Contractor of any Defects before the end of the Defects Liability Period, which begins at issuance of taking over certificate pursuant to GCC clause 69.2, and is **defined in the SCC**. The Defects Liability Period shall be extended for as long as Defects remain to be corrected.
	42.2 Every time notice of a Defect is given; the Contractor shall correct the notified Defect within the length of time specified by the Project Manager's notice.
43.Uncorrected Defects	43.1 If the Contractor has not corrected a Defect within the time specified in the Project Manager's notice, the Project Manager shall assess the cost of having

	the Defect corrected, and the Contractor shall pay this amount.
D. Cost Control	
44. Contract Price	44.1 In the case of a Unit Rate contract, the Bill of Quantities shall contain priced items for the Works to be performed by the Contractor. The Bill of Quantities is used to calculate the Contract Price. The Contractor will be paid for the quantity of the work accomplished at the rate in the Bill of Quantities for each item.
	44.2 In the case of a lump sum contract, the Activity Schedule shall contain the priced activities for the Works to be performed by the Contractor. The Activity Schedule is used to monitor and control the performance of activities on which basis the Contractor will be paid. If payment for Materials on Site shall be made separately, the Contractor shall show delivery of Materials to the Site separately on the Activity Schedule.
45. Changes in the Contract Price	45.1 In the case of an Unit Rate contract: (a) If the final quantity of the work done differs from the quantity in the Bill of Quantities for the particular item by more than 25 percent, provided the change exceeds 2 percent of the Initial Contract Price, the Project Manager shall adjust the rate to allow for the change. (b) If requested by the Project Manager, the Contractor shall provide the Project Manager with a detailed cost breakdown of any rate in the Bill of Quantities.
	45.2 In the case of a lump sum contract, the Activity Schedule shall be amended by the Contractor to accommodate changes of Program or method of working made at the Contractor's own discretion. Prices in the Activity Schedule shall not be altered when the Contractor makes such changes to the Activity Schedule.
46. Variations	46.1 All Variations shall be included in updated Programs, and, in the case of a lump sum contract, also in the Activity Schedule, produced by the Contractor.
	46.2 The Contractor shall provide the Project Manager with a quotation for carrying out the Variation when requested to do so by the Project Manager. The Project Manager shall assess the quotation, which shall be given within seven (7) days of the request or within any longer period stated by the Project Manager and before the Variation is ordered.
	46.3 If the Contractor's quotation is unreasonable, the Project Manager may order the Variation and make a change to the Contract Price, which shall be based on the Project Manager's own forecast of the effects of the Variation on the Contractor's costs.
	46.4 If the Project Manager decides that the urgency of varying the work would prevent a quotation being given and considered without delaying the work, no quotation shall be given and the Variation shall be treated as a Compensation Event.
	46.5 The Contractor shall not be entitled to additional payment for costs that could have been avoided by giving early warning.
	46.6 In the case of an Unit Rate contract, if the work in the Variation corresponds to

	an item description in the Bill of Quantities and if, in the opinion of the Project Manager, the quantity of work above the limit stated in **GCC 45.1** or the timing of its execution do not cause the cost per unit of quantity to change, the rate in the Bill of Quantities shall be used to calculate the value of the Variation. If the cost per unit of quantity changes, or if the nature or timing of the work in the Variation does not correspond with items in the Bill of Quantities, the quotation by the Contractor shall be in the form of new rates for the relevant items of work.
47.Cash Flow Forecasts	47.1 When the Program, or, in the case of a lump sum contract, the Activity Schedule, is updated, the Contractor shall provide the Project Manager with an updated cash flow forecast.
48.Payment Certificates	48.1 The Contractor shall submit to the Project Manager monthly statements of the estimated value of the work executed less the cumulative amount certified previously.
	48.2 The Project Manager shall check the Contractor's monthly statement and certify the amount to be paid to the Contractor within 30 days of submission by contractor.
	48.3 The value of work executed shall be determined by the Project Manager.
	48.4 The value of work carried out shall comprise: (a) In the case of a Unit Rate contract, the value of the quantities of work in the Bill of Quantities that have been completed; or (b) In the case of a lump sum contract, the value of work executed shall comprise the value of completed activities in the Activity Schedule.
	48.5 The value of work executed shall include the valuation of Variations and Compensation Events.
	48.6 The Project Manager may exclude any item certified in a previous certificate or reduce the proportion of any item previously certified in any certificate in the light of later information.
49. Payments	49.1 Payments shall be adjusted for deductions for advance payments and retention. The Employer shall pay the Contractor the amounts certified by the Project Manager within 30 days of the date of each certificate. If the Employer makes a late payment, the Contractor shall be paid interest as **indicated in the SCC** on the late payment in the next payment. Interest shall be calculated from the date by which the payment should have been made up to the date when the late payment is made.
	49.2 If an amount certified is increased in a later certificate or as a result of an award by an Arbitrator, the Contractor shall be paid interest in the delayed payment as set out in this clause. Interest shall be calculated from the date upon which the increased amount would have been certified in the absence of dispute.
	49.3 Items of the Works for which no rate or price has been entered in BOQ shall not be paid for by the Employer and shall be deemed covered by other rates and

	prices in the Contract.
50.Compensation Events	50.1 The following shall be Compensation Events: (a) The Employer does not give access to a part of the Site by the Site Possession Date pursuant to GCC 26.1. (b) The Employer modifies the Schedule of Other Contractors in a way that affects the work of the Contractor under the Contract. (c) The Project Manager orders a delay or does not issue Drawings, Specifications, or instructions required for execution of the Works on time. (d) The Project Manager instructs the Contractor to uncover or to carry out additional tests upon work, which is then found to have no Defects. (e) The Project Manager unreasonably does not approve a subcontract to be let. (f) Ground conditions are substantially more adverse than could reasonably have been assumed before issuance of the Letter of Acceptance from the information issued to bidders (including the Site Investigation Reports), from information available publicly and from a visual inspection of the Site. (g) The Project Manager gives instructions for dealing with an unforeseen condition, caused by the Employer, or additional work required for safety or other reasons. (h) Other contractors, public authorities, utilities, or the Employer does not work within the dates and other constraints stated in the Contract, and they cause delay or extra cost to the Contractor. (i) The advance payment is delayed. (j) The effects on the Contractor of any of the Employer's Risks. (k) The Project Manager unreasonably delays issuing a Certificate of Completion.
	50.2 If a Compensation Event would cause additional cost or would prevent the work being completed before the Intended Completion Date, the Contract Price shall be increased and/or the Intended Completion Date shall be extended. The Project Manager shall decide whether and by how much the Contract Price shall be increased and whether and by how much the Intended Completion Date shall be extended.
	50.3 As soon as information demonstrates effect of each Compensation Event upon the Contractor's forecast cost has been provided by the Contractor, it shall be assessed by the Project Manager, and the Contract Price shall be adjusted accordingly. If the Contractor's forecast is deemed unreasonable, the Project Manager shall adjust the Contract Price based on the Project Manager's own forecast. The Project Manager shall assume that the Contractor shall react competently and promptly to the event.
	50.4 The Contractor shall not be entitled to compensation to the extent that the Employer's interests are adversely affected by the Contractor's not having given early warning or not having cooperated with the Project Manager.

51. Tax	51.1 The Project Manager shall adjust the Contract Price if taxes, duties, and other levies are changed between the date 30 days before the submission of bids for the Contract and the date of the last Completion certificate. The adjustment shall be the change in the amount of tax payable by the Contractor, provided such changes are not already reflected in the Contract Price or are a result of GCC 53.
52. Currency	52.1 The currency of Contracts shall be Nepalese Rupees.
53.Price Adjustment	53.1 Prices shall be adjusted for fluctuations in the cost of inputs only if **provided for in the SCC**. If so provided, the amounts certified in each payment certificate, before deducting for Advance Payment, shall be adjusted by applying the respective price adjustment factor to the payment amounts due.
	53.2 Adjustment Formulae[7]: The formulae will be of the following general type: $pn = A + b\frac{Ln}{Lo} + c\frac{Mn}{Mo} + d\frac{En}{Eo} + etc.$ Where: *pn* is a price adjustment factor to be applied to the amount for the payment of the work carried out in the subject month, determined in accordance with Clause 49; *A* is a constant, specified in the Bidding Forms- Table of Price Adjustment data, representing the nonadjustable portion in contractual payments;[8] b, c, d, etc., coefficients representing the estimated proportion of each cost element (labor, materials, equipment usage, etc.) in the Works or sections thereof, net of Provisional Sums, **as specified in the SCC;** *Ln, Mn, En,* etc., are the current cost indices or reference prices of the cost elements for month "n," determined pursuant to Sub-Clause 53.4, applicable to each cost element; and *Lo, Mo, Eo,* etc., are the base cost indices or reference prices corresponding to the above cost elements at the date specified in Sub-Clause 53.4
	53.3 Sources of Indices and Weightings: The sources of indices shall be those listed in the Bidding Forms- Table of Price Adjustment data, as approved by the Project Manager and stated in SCC. Indices shall be appropriate for their purpose and shall relate to the Contractor's proposed source of supply of inputs based on which his Contract shall have been computed. As the proposed basis for price adjustment, the Contractor shall have submitted with his bid the tabulation of Weightings and Source of Indices in the Bidding Forms, which shall be subject to approval by the Project Manager.
	53.4 Base, Current and Provisional Indices: The base cost indices or prices shall be those prevailing on the day 30 days prior to the latest date for submission

[7] For complex Works involving several types of construction work with different inputs, a family of Formulae will be necessary. The various items of Day work may also require different formulae, depending on the nature and source of the inputs

[8] Insert a figure for factor A only where there is a part of the Contractors' expenditures which will not be subject to fluctuation in cost or to compensate for the unreliability of some indices. A should normally be 0.15. The sum of A, b, c, d, etc., should be one.

	of bids. Current indices or prices shall be those prevailing on the day 30 days prior to the last day of the period to which a particular Interim Payment Certificate is related. If at any time the current indices are not available, provisional indices as determined by the Project Manager will be used, subject to subsequent correction of the amounts paid to the Contractor when the current indices become available.
	53.5 Weightings: The weightings for each of the factors of cost given in the Bidding Forms shall be adjusted if, in the opinion of the Project Manager, they have been rendered unreasonable, unbalanced or inapplicable as a result of varied or additional work already executed or instructed under Clause 46 or for any other reason.
	53.6 Where, price adjustment provision is not applicable pursuant to Sub-clause 53.1 then the Contract is subject to price adjustment only for construction material in accordance with this clause. If the prices of the construction materials stated in the contract is increased or decreased in an unexpected manner in excess of ten (10%) percent in comparison to the base price construction material stated in Section –IV, Bidding Forms-Table of Price Adjustment Data, then the price adjustment for the increase or decrease of price of the construction material beyond 10% shall be made by applying the following formulas: For unexpected increase in price $P = [R_1 - (R_0 \times 1.10)] \times Q$ For unexpected decrease in price P $= [R_1 - (R_0 \times 0.90)] \times Q$ Where: "P" is price adjustment amount "R_1" is the present price of the construction material (Source of indices shall be those listed in the Bidding forms) "R_0" is the base price of the construction material "Q" is quantity of the construction material consumed in construction during the period of price adjustment consideration If the Base price and source is to be proposed by the Bidder as per the provision made in Section –IV, Bidding Forms-Table of Price Adjustment Data then the Base price and source filled by Bidder for the construction material stated in the Bidding Form shall be subject to the approval of the Project manager and shall be as **stated in SCC**.
	53.7 The Price Adjustment amount shall be limited to a maximum of the initial Contract Amount **as specified in the SCC**.
	53.8 The Price Adjustment provision shall not be applicable for delayed period if the contract is not completed in time due to the delay caused by the contractor or the contract is a Lump sum Contract.
54. Retention	54.1 The Employer shall retain from each payment due to theContractor the proportion **stated in the SCC** until Completion of the whole of the Works.

	54.2 Upon the issue of a Defects Liability Certificate by the Project Manager, in accordance with GCC 70.1, half the total amount retained shall be repaid to the Contractor and half when the Contractor has submitted the evidence of submission of tax return to the concerned Internal Revenue Office.
	54.3 The Contractor may substitute retention money with an unconditional bank guarantee issued by Commercial Bank or Financial Institution eligible to issue Bank Guarantee as per prevailing Law if: (a) at least eighty (80) percent of the whole works have been completed, (b) progress of the works is satisfactory in accordance with the Contract as per approved work schedule, and (c) it can be assured that the work can be completed at the intended completion date. The validity of the bank guarantee under this sub-clause shall be at least 30 days beyond the end of Defect Liability Period.
	54.4 If retention money is substituted by bank guarantee in accordance with clause 54.3, the bank guarantee shall be submitted either using the Retention Money Security Form included in Section X (Contract Forms) or in another Form acceptable to the employer. The validity of the bank guarantee shall be at least one month more than the end of defect liability period.
55.Liquidated Damages	55.1 The Contractor shall pay liquidated damages to the Employer at the rate per day **stated in the SCC** for each day that the Completion Date is later than the Intended Completion Date. The total amount of liquidated damages shall not exceed the amount **defined in the SCC**. The Employer may deduct liquidated damages from payments due to the Contractor. Payment of liquidated damages shall not affect the Contractor's liabilities.
	55.2 If the Intended Completion Date is extended after liquidated damages have been paid, the Project Manager shall correct any overpayment of liquidated damages by the Contractor by adjusting the next payment certificate. The Contractor shall be paid interest on the overpayment, calculated from the date of payment to the date of repayment, at the rates specified in GCC 49.
56. Bonus	56.1 The Contractor shall be paid a Bonus calculated at the rate per calendar day **stated in the SCC** for each day (less any days for which the Contractor is paid for acceleration) that the Completion is earlier than the Intended Completion Date. The Project Manager shall certify that the Works are complete, although they may not be due to be complete.
57.Advance Payment	57.1 Unless otherwise **stated in SCC,** the Employer shall make advance payment to the Contractor of the amounts stated in the SCC, in two equal installments by the date **stated in the SCC**, against provision by the Contractor of an unconditional bank guarantee from Commercial Bank or Financial Institution eligible to issue Bank Guarantee as per prevailing Law in a form acceptable to the Employer in amounts equal to the advance payment. The guarantee shall remain effective until the advance payment has been repaid, but the amount of the guarantee shall be progressively reduced by the

	amounts repaid by the Contractor. Interest shall not be charged on the advance payment. The validity of the bank guarantee under this sub-clause shall be at least 30 days beyond the end of intended completion date. The contractor shall submit the list of activities for which the Advance Payment for mobilization is to be used along with their time schedules.
	57.2 The Contractor is to use the advance payment only to pay for the purpose of construction site preparation, establishment of temporary camp facilities, construction of workers' housing, mobilization of labors, materials or equipment etc. required specifically for execution of the Contract. The Contractor shall demonstrate that advance payment has been used in this way by supplying copies of invoices or other documents to the Project Manager.
	57.3 The advance payment shall be repaid by deducting proportionate amounts, **as stated in SCC**, from payments otherwise due Contractor, following the schedule of completed percentages of the Works on a payment basis. No account shall be taken of the advance payment or its repayment in assessing valuations of work done, Variations, price adjustments, Compensation Events, Bonuses, or Liquidated Damages.
	57.4 If the advance provided under GCC 57.1 is not repaid due to non-performance of the works under the contract, by the contractor within the time period specified in the contract, the Employer shall recover the advance by enforcing the bank guarantee as provided under GCC 57.1 and shall also recover interest on the advance amount from the contractor at a rate **stated in SCC.**
58. Securities	58.1 The Performance Security, including any additional security required as per ITB 29.5, shall be provided to the Employer no later than the date specified in the Letter of Acceptance and shall be issued in an amount **specified in the SCC,** by a Commercial Bank or Financial Institution eligible to issue Bank Guarantee as per prevailing Law in Nepal in accordance with the conditions of Contract using Sample Form for the Performance Security included in Section IX (Contract Forms), or another form acceptable to the Employer, and denominated in Nepalese Rupees. The Performance Security shall be valid until a date 30 days beyond the end of the Defect Liability Period. Any additional performance security required as per ITB 29.5 shall be valid until a date 30 days beyond the end of the intended completion date.
	58.2 The performance security issued by any foreign Bank outside Nepal must be counter guaranteed by a Commercial Bank or Financial Institution eligible to issue Bank Guarantee as per prevailing Law in Nepal.
59. Day works	59.1 If applicable, the Day works rates in the Contractor's Bid shall be used for small additional amounts of work only when the Project Manager has given written instructions in advance for additional work to be paid for in that way.
	59.2 All work to be paid for as Day works shall be recorded by the Contractor on forms approved by the Project Manager. Each completed form shall be verified and signed by the Project Manager within two days of the work being done.
	59.3 The Contractor shall be paid for Day works subject to obtaining signed Day works forms.
60. Cost of	60.1 Loss or damage to the Works or Materials to be incorporated in the Works

Repairs	between the Start Date and the end of the Defects Correction periods shall be remedied by the Contractor at the Contractor's cost if the loss or damage arises from the Contractor's acts or omissions.
F. Force Majeure	
61.Definition of Force Majeure	61.1 In this Clause, "Force Majeure" means an exceptional event or circumstance, (a) which is beyond a Party's control; (b) which such Party could not reasonably have provided against before entering into the Contract; (c) which, having arisen, such Party could not reasonably have avoided or overcome; and (d) which is not substantially attributable to the other Party.
	61.2 Force Majeure may include, but is not limited to, exceptional events or circumstances of the kind listed below, so long as conditions (a) to (d) above are satisfied: (a) war, hostilities (whether war be declared or not), invasion, act of foreign enemies; (b) rebellion, terrorism, sabotage by people other than the Contractor's Personnel, revolution, insurrection, military or usurped power, or civil war; (c) riot, commotion, disorder, strike or lockout by people other than the Contractor's Personnel; (d) munitions of war, explosive materials, ionizing radiation or contamination by radioactivity, except as may be attributable to the Contractor's use of such munitions, explosives, radiation or radioactivity; and (e) natural catastrophes such as earthquakes, hurricanes, typhoon or volcanic activity.
62. Notice of Force Majeure	62.1 If a Party is or will be prevented from performing its substantial obligations under the Contract by Force Majeure, then it shall give notice to the other Party of the event or circumstances constituting the Force Majeure and shall specify the obligations, the performance of which is or will be prevented. The notice shall be given within 14 days after the Party became aware, or should have become aware, of the relevant event or circumstance constituting Force Majeure.
	62.2 The Party shall, having given notice, be excused performance of its obligations for so long as such Force Majeure prevents it from performing them.
	62.3 Notwithstanding any other provision of this Clause, Force Majeure shall not apply to obligations of either Party to make payments to the other Party under the Contract.
63. Duty to	63.1 Each Party shall at all times use all reasonable endeavors to minimize any

Minimize Delay	delay in the performance of the Contract as a result of Force Majeure.
	63.2 A Party shall give notice to the other Party when it ceases to be affected by the Force Majeure.
64. Consequences of Force Majeure	64.1 If the Contractor is prevented from performing its substantial obligations under the Contract by Force Majeure of which notice has been given under GCC 62, and suffers delay and/or incur Cost by reason of such Force Majeure, the Contractor shall be entitled subject to GCC 30 to (a) an extension of time for any such delay, if completion is or will be delayed, under GCC35; and (b) if the event or circumstance is of the kind described in sub-paragraphs (a) to (d) of GCC 61.2 and, in the case of subparagraphs (b) to (d), occurs in the Country, payment of any such Cost, including the costs of rectifying or replacing the Works and/or Goods damaged or destructed by Force Majeure, to the extent they are not indemnified through the insurance policy referred to in GCC 19.
	64.2 After receiving this notice, the Project Manager shall proceed in accordance with GCC 10 to agree or determine these matters.
65. Force Majeure Affecting Subcontractor	65.1 If any Subcontractor is entitled under any contract or agreement relating to the Works to relief from force majeure on terms additional to or broader than those specified in this Clause, such additional or broader force majeure events or circumstances shall not excuse the Contractor's nonperformance or entitle him to relief under this Clause.
66.Optional Termination, Payment and Release	66.1 If the execution of substantially all the Works in progress is prevented for a continuous period of 90 days by reason of Force Majeure of which notice has been given under GCC 62, or for multiple periods which total more than 150 days due to the same notified Force Majeure, then either Party may give to the other Party a notice of termination of the Contract. In this event, the termination shall take effect 7 days after the notice is given, and the Contractor shall proceed in accordance with GCC 72.5.
	66.2 Upon such termination, the Project Manager shall determine the value of the work done and issue a Payment Certificate, which shall include (a) the amounts payable for any work carried out for which a price is stated in the Contract; (b) the Cost of Plant and Materials ordered for the Works which have been delivered to the Contractor, or of which the Contractor is liable to accept delivery: this Plant and Materials shall become the property of (and be at the risk of) the Employer when paid for by the Employer, and the Contractor shall place the same at the Employer's disposal; (c) other Costs or liabilities which in the circumstances were reasonably and necessarily incurred by the Contractor in the expectation of completing the Works; (d) the Cost of removal of Temporary Works and Contractor's Equipment

	from the Site and the return of these items to the Contractor's works in his country (or to any other destination at no greater cost); and (e) the Cost of repatriation of the Contractor's staff and labor employed wholly in connection with the Works at the date of termination.
67. Release from Performance	67.1 Notwithstanding any other provision of this Clause, if any event or circumstance outside the control of the Parties (including, but not limited to, Force Majeure) arises, which makes it impossible or unlawful for either or both Parties to fulfill its or their contractual obligations or which, under the law governing the Contract, entitles the Parties to be released from further performance of the Contract, then upon notice by either Party to the other Party of such event or circumstance, (a) the Parties shall be discharged from further performance, without prejudice to the rights of either Party in respect of any previous breach of the Contract; and (b) the sum payable by the Employer to the Contractor shall be the same as would have been payable under GCC 66 if the Contract had been terminated under GCC 66.
G. Finishing the Contract	
68. Completion	68.1 The Contractor shall request the Project Manager to issue a certificate of Completion of the Works, and the Project Manager shall do so upon deciding that the work is completed.
	68.2 In addition to the other provisions, before acceptance of the completed works, Employer shall verify and assure that such works are within the set objective, quality and appropriate to operate and use.
69. Taking Over	69.1 In the contractor's Opinion, if the works are complete and ready for taking over, the contractor may apply by notice to the Project Manager for a Taking-Over Certificate. If the Works are divided into Sections, the Contractor may similarly apply for a Taking-Over Certificate for each Section.
	69.2 The Project Manager shall, within 30 days after receiving the Contractor's application: (a) issue the Taking-Over Certificate to the Contractor if physical progress of works is at least ninety (90) percent in accordance with the Contract except for any minor outstanding work and defects (as listed in the Taking-Over Certificate) which will not substantially affect the use of the Works or Section for their intended purpose (either until or whilst this work is completed and these defects are remedied); or (b) reject the application, giving reasons and specifying the work required to be done by the Contractor to enable the Taking-Over Certificate to be issued. The Contractor shall then complete this work before issuing a further notice under this Sub-Clause.

	69.3 If the Engineer fails either to issue the Taking-Over Certificate or to reject the Contractor's application within the period of 30 days, and if the Works or Section (as the case may be) are substantially completed in accordance with the Contract, the Taking-Over Certificate shall be deemed to have been issued on the last day of that period.
70. Final Account	70.1 The Contractor shall supply the Project Manager with a detailed account of the total amount that the Contractor considers payable under the Contract before the end of the Defects Liability Period. The Project Manager shall issue a Defects Liability Certificate and certify any final payment that is due to the Contractor within 60 days of receiving the Contractor's account if it is correct and complete. If it is not, the Project Manager shall issue within 60 days a schedule that states the scope of the corrections or additions that are necessary. If the Final Account is still unsatisfactory after it has been resubmitted, the Project Manager shall decide on the amount payable to the Contractor and issue a payment certificate.
71. Operating and Maintenance Manuals	71.1 If "as built" Drawings and/or operating and maintenance manuals are required, the Contractor shall supply them by the **dates stated in the SCC**.
	71.2 If the Contractor does not supply the Drawings and/or manuals by the dates **stated in the SCC** pursuant to **GCC 71.1,** or they do not receive the Project Manager's approval, the Project Manager shall withhold the amount **stated in the SCC** from payments due to the Contractor.
72. Termination	72.1 The Employer may terminate the Contract at any time if the contractor; a. does not commence the work as per the Contract, b. abandons work without completing, c. fails to achieve progress as per the Contract.
	72.2 The Employer or the Contractor may terminate the Contract if the other party causes a fundamental breach of the Contract.
	72.3 Fundamental breaches of Contract shall include, but shall not be limited to, the following: a) the Contractor uses the advance payment for matters other than the contractual obligations, b) the Contractor stops work for 30 days when no stoppage of work is shown on the current Program and the stoppage has not been authorized by the Project Manager; c) The Project Manager instructs the Contractor to delay the progress of the Works, and the instructions are not withdrawn within 30 days; d) The Employer or the Contractor is made bankrupt or goes into liquidation other than for reconstruction or amalgamation. e) a payment certified by the Project Manager is not paid by the Employer to the Contractor within 90 days of the date of the Project Manager's certificate; f) the Project Manager gives Notice that failure to correct a particular Defect is a fundamental breach of Contract and the Contractor fails to correct it within a reasonable period determined by the Project Manager;

	g)the Project Manager gives two consecutive Notices to update the Program and accelerate the works to ensure compliance with GCC Sub clause 22.1 and the Contractor fails to update the Program and demonstrate acceleration of the works within a reasonable period of time determined by the Project Manager; h)the Contractor does not maintain a Security, which is required; i) the Contractor has delayed the completion of the Works by the number of days for which the maximum amount of liquidated damages can be paid, **as defined in the SCC**; and j) If the Contractor, in the judgment of the Employer has engaged in corrupt or fraudulent practices in competing for or in executing the Contract, pursuant to GCC 73.1. k)The Contractor fails to submit Performance Security, Advanced Payment Guarantee (if any) and Insurance Policy documents with extended validity within the time prescribed pursuant to GCC 35.3.
	72.4 When either party to the Contract gives notice of a breach of Contract to the Project Manager for a cause other than those listed under GCC 72.3 above, the Project Manager shall decide whether the breach is fundamental or not.
	72.5 Notwithstanding the above, the Employer may terminate the Contract for convenience.
	72.5 Notwithstanding the above, the Employer may terminate the Contract for convenience. 72.6 If the Contract is terminated, the Contractor shall stop work immediately, make the Site safe and secure, and leave the Site as soon as reasonably possible.
73.Fraud and Corruption	73.1 If the Employer determines that the Contractor has engaged in corrupt, fraudulent, collusive, coercive or obstructive practices, in competing for or in executing the Contract, then the Employer may, after giving 15 days' notice to the Contractor, terminate the Contractor's employment under the Contract and expel him from the Site.
	73.2 Should any employee of the Contractor be determined to have engaged in corrupt, fraudulent, collusive, coercive, or obstructive practice during the execution of the Works, then that employee shall be removed in accordance with GCC Clause 15. For the purposes of this GCC 73; (i) "corrupt practice" is the offering, giving, receiving or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party. (ii) "fraudulent practice"[5] is any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation; (iii) "collusive practice"[6] is an arrangement between two or more parties designed to achieve an improper purpose, including to influence

	improperly the actions of another party; (iv) "coercive practice"[7] is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party; (v) "obstructive practice" is (aa) deliberately destroying, falsifying, altering or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede a investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; and/or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation; or (bb) acts intended to materially impede the exercise of the GON's/DP's inspection and audit rights provided for under GCC28.3.
	73.3 The contractor shall be prosecuted for offenses under prevailing criminal laws, if the contractor: (i) Misuses the Advance Payment or payments received from the Employer; (ii) Receives payment by submitting false information or documents; (iii) Abandons work before completion; (iv) Commits a serious violation of the contract; or (v) Causes loss or damage to the Employer.
74. Blacklisting	74.1 Without prejudice to any other rights of the Employer under this Contract, GoN, Public Procurement Monitoring Office (PPMO), on the recommendation of procuring entity, may blacklist a Bidder or contractor for its conduct for a period of one (1) to three (3) years on the following grounds and seriousness of the act committed by the bidder or contractor: (a) if it is established that the Contractor has committed substantial defect in implementation of the contract or has not substantially fulfilled its obligations under the contract or the completed work is not of the specified quality as per the contract. (b) If convicted from a court of law in a criminal offense liable to be disqualified for taking part in procurement contract, (c) If it is established that the Contractor has engaged in corrupt or fraudulent practices in competing for or in executing the Contract.
75. Payment upon Termination	75.1 If the Contract is terminated because of a fundamental breach of Contract by the Contractor, the Project Manager shall issue a certificate for the value of the work done and Materials ordered fewer advance payments received up to the date of the issue of the certificate. Additional Liquidated Damages shall not apply. If the total amount due to the Employer exceeds any payment due to the Contractor, the difference shall be a debt payable to the Employer.
	75.2 If the Contract is terminated for the Employer's convenience or because of a fundamental breach of Contract by the Employer, the Project Manager shall issue a certificate for the value of the work done, Materials ordered, the reasonable cost of removal of Equipment, repatriation of the Contractor's personnel employed solely on the Works, and the Contractor's costs of protecting and securing the

	Works, and less advance payments received up to the date of the certificate.
	75.3 If the Contract is terminated because of fundamental breach of Contract or for any other fault by the Contractor, the Employer may: (a) withhold further payments to the Contractor until the costs of design, execution, completion and remedying of any defects, liquidated damages (if any), and all other costs incurred by the Employer, have been established, and/or (b) recover from the Contractor any losses and damages incurred by the Employer and any extra costs of completing the Works, after allowing for any sum due to the Contractor, as Government dues. After recovering any such losses, damages and extra costs, the Employer shall pay any balance to the Contractor. (c) forfeit the Performance Security. If the total amount due to the Employer exceeds any payment due to the Contractor, the difference shall be a debt payable to the Employer.
76. Property	76.1 All Materials on the Site, Plant, Equipment, Temporary Works, and Works shall be deemed to be the property of the Employer if the Contract is terminated because of the Contractor's default.
77.Release from Performance	77.1 If the Contract is frustrated by the outbreak of war or by any other event entirely outside the control of either the Employer or the Contractor, the Project Manager shall certify that the Contract has been frustrated. The Contractor shall make the Site safe and stop work as quickly as possible after receiving this certificate and shall be paid for all work carried out before receiving it and for any work carried out afterwards to which a commitment was made.
78. Suspension of DP Loan/Credit/ Grant	78.1 In the event that the DP suspends the loan/ credit/grant to the Employer from which part of the payments to the Contractor are being made: a. the Employer is obligated to notify the Contractor of such suspension within 7 days of having received the DP's suspension notice; and b. if the Contractor has not received sums due him within the 30 days for payment provided for in GCC 49.1, the Contractor may immediately issue a 15-day termination notice.
79. Eligibility	79.1 The Contractor shall have the nationality of an eligible country as specified in Section V of the bidding document. The Contractor shall be deemed to have the nationality of a country if the Contractor is a citizen or is constituted or incorporated and operates in conformity with the provisions of the laws of that country. This criterion shall also apply to the determination of the nationality of proposed subcontractors or suppliers for any part of the Contract including related services.
	79.2 The materials, equipment, and services to be supplied under the Contract shall have their origin in eligible source countries **as specified in SCC** and all expenditures under the Contract will be limited to such materials, equipment, and services. At the Employer's request, the Contractor may be required to provide evidence of the origin of materials, equipment, and services.
	79.3 For purposes of GCC 79.2, "origin" means the place where the materials and equipment are mined, grown, produced, or manufactured, and from which the

	services are provided. Materials and equipment are produced when, through manufacturing, processing, or substantial or major assembling of components, a commercially recognized product results that differ substantially in its basic characteristics or in purpose or utility from its components.
80.ProjectManager's Duties and Authorities	80.1 The Project Manager's duties and authorities are restricted to the extent **stated in the SCC**.
81.Quarries and Spoil Dumps	81.1 Any quarry operated as part of this Contract shall be maintained and left in a stable condition without steep slopes and be either refilled or drained and be landscaped by appropriate planting. Rock or gravel taken from a river shall be removed over some distance so as to limit the depth of material removed at any one location, not disrupt the river flow or damage or undermine the riverbanks. The Contractor shall not deposit excavated material on land in Government or private ownership except as directed by the Project Manager in writing or by permission in writing of the authority responsible for such land in Government ownership, or of the owner or responsible representative of the owner of such land in private ownership, and only then in those places and under such conditions as the authority, owner or responsible representative may prescribe.
82. Local Taxation	82.1 The prices bid by the Contractor shall include all taxes that may be levied in accordance to the laws and regulations in being in Nepal on the date 30 days prior to the closing date for submissions of Bids on the Contractor's equipment, plant and materials acquired for the purpose of the Contract and on the services performed under the Contract. Nothing in the Contract shall relieve the Contractor from his responsibility to pay any tax that may be levied in Nepal on profits made by him in respect of the Contract.
83. Value Added Tax	83.1 The Contract is not exempted from value added tax. An amount specified in the schedule of taxes shall be paid by the Contractor in the concerned VAT office within time frame specified in VAT regulation.
84. Income Taxes on Staff	84.1 The Contractor's staff, personnel and labor will be liable to pay personal income taxes in Nepal in respect of their salaries and wages, as are chargeable under the laws and regulations for the time being in force, and the Contractor shall perform such duties in regard to such deductions as may be imposed on him by such laws and regulations.
	84.2 The issue of the Final Account Certificate pursuant to clause GCC 70 shall be made only upon submittal by the Contractor of a certificate of income tax clearance from the Government of Nepal.
85. Duties, Taxes and Royalties	85.1 Any element of royalty, duty or tax in the price of any goods including fuel oil, and lubricating oil, cement, timber, iron and iron goods locally procured by the Contractor for the works shall be included in the Contract rates and prices and no reimbursement or payment in that respect shall be made to the Contractor.
	85.2 The Contractor shall familiarize himself with GON the rules and regulations with regard to customs, duties, taxes, clearing of goods and equipment, immigration and the like, and it will be necessary for him to follow the required procedures regardless of the assistance as may be provided by the Employer

	wherever possible.
	85.3 The Contractor shall pay and shall not be entitled to the reimbursement of cost of extracting construction materials such as sand, stone/boulder, gravel, etc. from the riverbeds or quarries. Such prices will be raised by the concerned Local Government (LG) as may be in force at the time. The Contractor, sub-contractor(s) employed directly by him and for whom he is responsible, will not be exempted from payment of royalties, taxes or other kinds of surcharges on these construction materials so extracted and paid for to the concerned Local Government (LG)
86. Member of Government, etc, not Personally Liable	86.1 No member or officer of GoN or the Employer or the Project Manager or any of their respective employees shall be in any way personally bound or liable for the act or obligations of the Employer under the Contract or answerable for any default or omission in the observance or performance of any of act, matter or thing which are herein contained.
87. Approval of Use of Explosives	87.1 No explosives of any kind shall be used by the Contractor without the prior consent of the Employer in writing and the Contractor shall provide, store and handle these and all other items of every kind whatsoever required for blasting operations, all at his own expense in a manner approved in writing by the Employer.
88 Compliance with Regulations for Explosives	88.1 The Contractor shall comply with all relevant ordinances, instructions and regulations which the Government, or other person or persons having due authority, may issue from time to time regarding the handling, transportation, storage and use of explosives.
89. Permission for Blasting	89.1 The Contractor shall at all times maintain full liaison with and inform well in advance, and obtain such permission as is required from all Government authorities, public bodies and private parties whatsoever concerned or affected, or likely to be concerned or affected by blasting operation.
90.Records of Explosives	90.1 Before the beginning of the Defects Liability Period, the Contractor shall account to the satisfaction of the Project Manager for all explosives brought on to the Site during the execution of the Contract and the Contractor shall remove all unused explosives from the Site on completion of works when ordered by the Project Manager.
91. Traffic Diversion	91.1 The Contractor shall include the necessary safety procedures regarding and pedestrian traffic diversion that is needed in execution of the works. The Contractor shall include in his costing of works, any temporary works or diversion that are needed during the construction period. All traffic diversion should be designed for the safety of both the motoring public and the men at work. It shall ensure the uninterrupted flow of traffic and minimum inconvenience to the public during the period concerned. As such, adequate warning signs, flagmen and other relevant safety precautionary measures shall be provided to warn motorists and pedestrians well ahead of the intended diversion as directed by the Project Manager. All traffic devices used shall be designed in accordance with the instruction of Project Manager.
92. Social	92.1 The contractor shall enroll the laborers, employees, or other workforce engaged

Security Fund	in such work in the Social Security Fund in accordance with prevailing laws. 92.2 The contractor shall be responsible for disbursing the remuneration, benefits, and other payments of the laborers, employees, or workforce into the bank account of the concerned individual. 92.3 The contractor shall be responsible for ensuring that the required work permit has been obtained in accordance with prevailing laws in respect of foreign personnel.

Section VIII: Special Conditions of Contract

The following Special Conditions of Contract shall supplement the GCC. Whenever there is a conflict, the provisions herein shall prevail over those in the GCC.

Kathmandu Upatyaka Khanepani Limited

Lalitpur Branch Office

Supply and Laying of 150mm dia DI Pipe (Secondary Pipe) at Lalitpur Metropolitan City-02, from Heritage Garden to Kantihitti, Kalika Mandir

Invitation for Bids No.: KUKL.LTR/NCB-11/083/084

Special Conditions of Contract

A. General	
GCC 1.1 (p)	The Employer is ***Kathmandu Upatyaka Khanepani Limited, Lalitpur Branch Office***
GCC 1.1 (u)	The Intended Completion Date for the whole of the Works shall be 2084/03/20 *[If different dates are specified for completion of the Works by section ("sectional completion" or milestones), these dates should be listed here]*
GCC 1.1(bb) & GCC 10.1	The Project Manager is ***Er. Bijaya Bishwokarma.*** The Project Manager and Engineer are synonyms.
GCC 1.1 (ee)	The Site is located ***at Lalitpur Metropolitan City-02, from Heritage Garden to Kantihitti, Kalika Mandir***
GCC 1.1 (hh)	The Start Date shall be after contract agreement.
GCC 1.1 (ll)	The Works consist of ***Supply and Laying of 150mm dia DI Pipe (Secondary Pipe) at Lalitpur Metropolitan City-02, from Heritage Garden to Kantihitti, Kalika Mandir***
GCC 2.2	Sectional Completions are: ***...N/A***
GCC 2.3 (i)	The following documents also form part of the Contract: ***N/A***
GCC 3.1	The language of the contract is **ENGLISH/NEPALI** The law that applies to the Contract is the law of NEPAL
GCC 11.1	The Project Manager ***may*** delegate any of his duties and responsibilities.
GCC 12.1 (a)	The agreed electronic transmission shall be: ***[E-mail or E-Fax or any other such means of Employer] and*** ***[E-mail or E-Fax or any other such means of Contractor.]***
GCC 14.1	Schedule of other contractors: ***N/A***
GCC 19.1	The minimum insurance amounts and deductibles shall be: 1. The minimum cover for loss of or damage to the Works, Plant and Materials is: **115 %** of the Contract Amount. 2. The maximum deductible for insurance of the Works and of Plant and Materials is: ***[insert value as per the provision of Nepal Insurance Authority].*** 3. The minimum cover for loss or damage to immovable Equipment/plants is : ***100% (i.e Replacement Cost)*** 4. The maximum deductible for insurance of immovable Equipment/plant is: ***[insert value as per the provision of Nepal Insurance Authority].***

	5. The minimum cover for loss of or damage to other property is: ***[insert amount]***[9]with unlimited number of occurrences 6. The maximum deductible for insurance of other property is: ***as per the provision of Nepal Insurance Authority.*** 7. The minimum cover for personal injury or death insurance i. for the Contractor's employees is that specified in the Labor act of Nepal and ii. for other people is ***:0.8 million.*** with an unlimited number of occurrences
GCC 20.1	Site Investigation Reports are: ***N/A***
GCC 23.1	The following shall be designed by the Contractor N/A
GCC 24.2	***[Insert OHS Policy, Guideline and/or Operating Manual, if any].***
GCC 26.1	The Site Possession Date(s) shall be: ***After contract agreement at Lalitpur Metropolitan City-02, from Heritage Garden to Kantihitti, Kalika Mandir.***
GCC 30.1	The place of arbitration shall be: ***NEPCA***
C. Time Control	
GCC 34.1	The Contractor shall submit for approval a Program for the Works within **15** days from the date of the Letter of Acceptance.
GCC 34.3	The period between Program updates is 30 days. The amount to be withheld for late submission of an updated Program is Rs. **25,000.00**
D. Quality Control	
GCC 42.1	The Defects Liability Period is: 365 days. *[The defects liability period is usually limited to 365 days but could be less in very simple cases or could be more in special cases as defined by employer.]*
E. Cost Control	
GCC 49.1	***[insert the prevailing interest rate]***
GCC 53.1	The Contract ***is not*** subject to price adjustment, and the following information regarding coefficients ***does not*** apply. The coefficients and indices for adjustment of prices in Nepalese Rupees shall be as specified in the Table of Adjustment Data submitted by bidder together with the Letter of Price Bid which is approved by the Project manager and attached as Annex-1.

[9] The amount depends on location, environment of construction site, surrounding property etc. and hence differs from case to case. Suitable amount should be inserted depending upon site condition and surrounding environment.

GCC 53.6	Base Price of Construction Materials applicable for price adjustment shall be as per the Table of Adjustment Data submitted by Bidder together with the Letter of Price Bid which is approved by the Project manager and attached as Annex-1.
GCC 53.7	The Price Adjustment amount shall be limited to a maximum of : ***N/A*** percentage of the initial Contract Amount (without VAT but including PS).
GCC 54.1	The proportion of payments retained is: 5 (five) percent.
GCC 55.1	The liquidated damages for the whole of the Works are 0.05 Percent of the final Contract Price (without VAT but including PS) per day. The maximum amount of liquidated damages for the whole of the Works is 10 Percent of the final Contract Price (without VAT but including PS).
GCC 56.1	The provision of bonus ***Not Applicable*** in the contract.
GCC 57.1	The provision of Advance Payments ***Not Applicable*** in the contract.
GCC 57.3	Deductions from Payment Certificates will commence in the first certificate in which the value of works executed exceeds 30% of the Contract Price. Deduction will be at the rate of ***[Insert percentage]***[10] of the respective Monthly Interim Payment Certificate until such time as the advance payment has been repaid; provided that the advance payment shall be completely repaid prior to the end of 80 % of the approved contract price.
GCC 57.4	Recover interest on the advance amount from the Contractor should be at a rate of **10 %**.
GCC 58.1	The Performance Security amount is: ***as per provision in PPA 2063 and PPR 2064***
G. Finishing the Contract	
GCC 71.1	The date by which operating and maintenance manuals are required is; *N/A*
GCC 71.2	The date by which "as built" drawings are required is: 30days after work completion. The amount to be withheld for failing to produce "as built" drawings and/or Operating and maintenance manuals is: Rs. **25,000.00**
GCC 72.3 (i)	The maximum number of days is: **200**
GCC 79.2	For GoN funded: For the purpose of Country of Origin: "all Countries"
GCC 80	The Project Manager has to obtain the specific approval of the Employer for taking any of the following actions : a. Approving subcontracting of any part of the works under General Conditions of Contract Clause 13; b. Certifying additional costs determined under General Conditions of Contract Clause 50; c. Determining start date under General Conditions of Contract Clause 1; d. Determining the extension of the intended Completion Date under General

[10] ***[% of advance payment × 100/(80-30)]****Note: All italicized text (including footnotes) is for use in preparing this form and shall be deleted from the final product.*

	Conditions of Contract Clause 35; e. Issuing a Variation under General Conditions of Contract Clause 1 and 46, except in an emergency situation, as reasonably determined by the Project Manager; emergency situation may be defined as the situation when protective measures must be taken for the safety of life or of the works or of adjoining property. f. Adjustment of rates under General Conditions of Contract Clause 45;

Section IX: Contract Forms

This Section contains forms which, once completed, will form part of the Contract. The forms for Performance Security and when required Advance Payment Security and Retention Money Security, shall only be completed by the successful Bidder after contract award.

Letter of Intent

[on letterhead paper of the Employer]

Date: ... ……

To: .....***Name and address of the Contractor***.....

Subject: …… Issuance of letter of intent to award the contract.....

This is to notify you that, it is our intention to award the contract ... . ***[insert date]*** .....for execution of the ... .***[insert name of the contract and identification number, as given in the Contract BDS/SCC]*** to you as your bid price ***Nepalese Rupees*** ..... ***[insert amount of contract price in figures and words including taxes]*** as corrected and modified in accordance with the Instructions to Bidders is hereby selected as substantially responsive evaluated bid closest to the Average Bid Price.

Authorized Signature: ……

Name: ... ……..

Title: ……..

CC:
[Insert name and address of all other Bidders, who submitted the bid]

[Notes on Letter of Intent
The issuance of Letter of Intent is the information of the selection of the bid of the successful bidder by the Employer and for providing information to other unsuccessful bidders who participated in the bid as regards to the outcome of the procurement process. This standard form of Letter of Intent to Award should be filled in and sent to the successful Bidder only after evaluation and selection of substantially responsible evaluated bid closest to the Average Bid Price.]

Letter of Acceptance

[on letterhead paper of the Employer]

Date: ……..

To: ……***Name and address of the Contractor***……...

Subject: ……*Notification of Award*

This is to notify that your Bid for the Invitation of Bids dated ***.....[Insert date of bid invitation]*** ……..for execution of the……..***[Insert name of the contract and identification number, as given in the Contract BDS/SCC]*** ……... for the Contract price of Nepalese Rupees ***[insert amount in figures and words including taxes],*** as corrected in accordance with the Instructions to Bidders is hereby accepted in accordance with the Instruction to Bidders.

You are hereby instructed to contact this office to sign the formal contract agreement within 15 days with Performance Security of **NRs**. ……. in accordance with the Conditions of Contract, using for that purpose the Performance security Form included in Section X (Contract Forms) of this Bidding Document.

Authorized Signature: ……...

Name and Title of Signatory: ……

Contract Agreement

THIS AGREEMENT made the .....day of…..between……. name of the Employer ***……(hereinafter "the Employer"),*** of the one part, and ……name of the Contractor ……(hereinafter "the Contractor"), of the other part:

WHEREAS the Employer desires that the Works known as …….... name of the Contract .....should be executed by the Contractor, and has accepted a Bid by the Contractor for the execution and completion of these Works and the remedying of any defects in the sum of NRs ***…..…..[insert amount of contract price in words and figures including taxes]***(hereinafter "the Contract Price").

The Employer and the Contractor agree as follows:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Contract documents referred to.

2. The following documents shall be deemed to form and be read and construed as part of this Agreement. This Agreement shall prevail over all other Contract documents.
   (a) the Letter of Acceptance;
   (b) the Letter of Bid;
   (c) the Addenda Nos ..... ***[Insert addenda numbers if any]***
   (d) the Special Conditions of Contract;
   (e) the List of Eligible Countries as per GCC,
   (f) the General Conditions of Contract;
   (g) the Specification;
   (h) the Drawings;
   (i) Bill of Quantities (or Schedules of Prices for lump sum contracts), and
   (j) Table of Price Adjustment Data
   (k) List of Approved Subcontractors
   (l).....***[Specify if there are any other document]***

3. In consideration of the payments to be made by the Employer to the Contractor as indicated in this Agreement, the Contractor hereby covenants with the Employer to execute the Works and to remedy defects therein in conformity in all respects with the provisions of the Contract.

4. The Employer hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and the remedying of defects therein, the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

IN WITNESS whereof the parties hereto have caused this Agreement to be executed in accordance with the laws of Nepal on the day, month and year indicated above.

Signed by …….
for and on behalf the Contractor in the presence of
Witness, Name, Signature, Address, Date

Signed by……..
for and on behalf of the Employer in the presence of
Witness, Name, Signature, Address, Date

Witness, Name Signature, Address, Date List of Approved Subcontractors

In accordance with GCC Sub-Clause 13.1, The following Subcontractors are approved for carrying out the work as specified below.

Name of Subcontractors	Description of Works	Value/Percentage of subcontract

Performance Security

(On letterhead paper of the Bank)

..... Bank's Name, and Address of Issuing Branch or Office .....

Beneficiary: ***..... [Insert Name and Address of Employer]*** …….....

Date: .....

Performance Guarantee No.:…….

We have been informed that ... ... ***[insert name of the Contractor, which in the case of a joint venture shall be the name of the joint venture]*** (hereinafter called "the Contractor") has been notified by you to sign the Contract No. …….. ***[insert reference number of the Contract]*** for the execution of …….. ***[insert name of contract and brief description of Works]*** (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, a performance guarantee is required.

At the request of the Contractor, we... ..... ***[insert name of the Bank]*** hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of Nepalese Rupees .....***[insert amount in figures* and amount in words)*** such sum being payable in Nepalese Rupees, upon receipt by us of your first demand in writing accompanied by a written statement stating that the Contractor is in breach of its obligation(s) under the Contract, without your needing to prove or to show grounds for your demand or the sum specified therein.

This guarantee shall expire, no later than the……***[insert day]***……..Day of ……***[insert month, year]***…… **, and any demand for payment under it must be received by us at this office on or before that date.

This guarantee is subject to the Uniform Rules for Demand Guarantees (URDG), 2010 Revisions,, ICC Publication No. 758 , .except that the supporting statement under Article 15(a) is hereby excluded..

……

Seal of Bank and Signature(s)

Note:

All italicized text is for guidance on how to prepare this demand guarantee and shall be deleted from the final document.

* *The Guarantor shall insert an amount representing the percentage of the Contract Price specified in the Contract in Nepalese Rupees.*

*** Insert the date thirty days after the date specified for the Defect Liability Period. The Employer should note that in the event of an extension of the time for completion of the Contract, the Employer would need to request an extension of this guarantee from the Guarantor. Such request must be in writing and must be made prior to the expiration date established in the guarantee.*

Advance Payment Security

(On letterhead paper of the Bank)

…….. Bank's Name, and Address of Issuing Branch or Office.....

Beneficiary: ……***[Insert Name and address of employer]***

Date : ……

Advance Payment Guarantee No……..

We have been informed that **……**…… ***[insert name of the Contractor, which in the case of a joint venture shall be the name of the joint venture]*** (hereinafter called "the Contractor") has entered into Contract No. ..... ***[insert refrence number of the contract]*** ……dated …… ***[insert agreement date]*** with you, for the execution of ***.....[Insert name of the contract and brief description of Works]*** (hereinafter called "the Contract").

Furthermore, we understand that, according to the Conditions of the Contract, an advance payment in the sum Nepalese Rupees ……. ***[insert amount in figures*and in words]*** is to be made against an advance payment guarantee.

At the request of the Contractor, we... ..... . ***[insert name of the Bank]*** hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of Nepalese Rupees …….***[insert*** amount in figures****. =and amount in words]*** upon receipt by us of your first demand in writing accompanied by a written statement stating that the Contractor is in breach of its obligation under the Contract because the Contractor:

(a) Used the advance payment for purposes other than the costs of mobilization in respect of the Works. Or

(b) .Has failed to repay the advance payment when it has become due and payable in accordance with the conditions of the contract, specifying the amount payable by the contractor.

The maximum amount of this guarantee shall be progressively reduced by the amount of the advance payment repaid by the Contractor as indicated in copies of interim statements or payment certificates which shall be presented to us. This guarantee shall expire, at the latest, upon our receipt of a copy of the interim payment certificate indicating that eighty (80) percent of the Contract Price has been certified for payment, or on the .. ***[insert day]***..... day of ... ***[insert month, year]***...**, whichever is earlier. Consequently, any demand for payment under this guarantee must be received by us at this office on or before that date.

This guarantee is subject to the Uniform Rules for Demand Guarantees (URDG), 2010 Revisions,, ICC Publication No. 758 , except that the supporting statement under Article 15(a) is hereby excluded..

……

Seal of Bank and Signature(s)

Note:

All italicized text is for guidance on how to prepare this demand guarantee and shall be deleted from the final document.

**The Guarantor shall insert an amount representing the amount of the advance payment in Nepalese Rupees of the advance payment as specified in the Contract.*

*** Insert the date Thirty days after the expected completion date. The Employer should note that in the event of an extension of the time for completion of the Contract, the Employer would need to request an extension of this guarantee from the Guarantor. Such request must be in writing and must be made prior to the expiration date established in the guarantee.*

Retention Money Security

(On letterhead paper of the Bank)

..... Bank's Name, and Address of Issuing Branch or Office.....

Beneficiary: _____ ***[Insert name and Address of Employer]***

Date: _____***[Insert date of issue]***

RETENTION MONEY GUARANTEE No.: ***[Insert guarantee reference number]***

We have been informed that _____ ***[insert name of Contractor, which in the case of a joint venture shall be the name of the joint venture]*** (hereinafter called "the Contractor") has entered into Contract No. _____ ***[insert reference number of the contract]*** dated _____ with the Beneficiary, for the execution of _____ ***[insert name of contract and brief description of*** **Works***]* (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, the Beneficiary retains moneys up to the limit set forth in the Contract ("the Retention Money"), and that when at least eighty (80) percent of the whole works have been completed, progress of the works is satisfactory in accordance with the Contract as per approved work schedule and it can be assured that the works can be completed at the intended completion date, payment of ***[insert the amount of the Retention Money]*** is to be made against a Retention Money guarantee.

At the request of the Contractor, we, .. . ***[insert name of the Bank]*** ……., as Guarantor, hereby irrevocably undertake to pay the Beneficiary any sum or sums not exceeding in total an amount of Nepalese Rupees _____ ***[insert amount in figures andamount in words]***[1] upon receipt by us of the Beneficiary's complying demand supported by the Beneficiary's statement, whether in the demand itself or in a separate signed document accompanying or identifying the demand, stating that the Contractor is in breach of its obligation(s) under the Contract, without your needing to prove or show grounds for your demand or the sum specified therein.

This guarantee shall expire no later than the …***[insert day]***... day of ……***[insert month, year***… [2], and any demand for payment under it must be received by us at the office indicated above on or before that date.

This guarantee is subject to the Uniform Rules for Demand Guarantees (URDG), 2010 Revisions,, ICC Publication No. 758 , except that the supporting statement under Article 15(a) is hereby excluded.

……

Seal of Bank and Signature(s)

Annex-1

Note: All italicized text (including footnotes) is for use in preparing this form and shall be deleted from the final product.

[1]*The Guarantor shall insert the amount of the Retention Money.*

[2]*Insert the same expiry date which is 30 days more than the end of Defect Liability Period. The Employer should note that in the event of an extension of this date for completion of the Contract, the Employer would need to request an extension of this guarantee from the Guarantor. Such request must be in writing and must be made prior to the expiration date established in the guarantee.*

Table of Price Adjustment Data
[GCC 53.1]

Code	Index Description	Source of Index*	Base Value and Date	Employer's Proposed Weighting Range (coefficient)	Bidder's Proposed Weighting (coefficient)**
1	**2**	**3**	**4**	**5**	**6**
	Non - adjustable (A)			0.15	0.15
	Labor (b)				
	Materials (c)				
	…				
	Equipment usage (d)				
		Total			**1.00**

Note: Base value and Bidder's proposed weighting coefficient to be filled as per "Bid Form of Table of Price Adjustment Data" in Bidding Forms (Section-IV) after verification by the Employer in case of the alternative provision of Bidder proposed value and weighting coefficient.

Table of Price Adjustment Data
[GCC 53.6]

Code	Construction Material*	Unit	Base Price (NRs/Unit) ** (Ex-factory)	Source (Factory)**
1	**2**	**3**	**4**	**5**

****** For the purpose of calculation of price adjustment, the Ex-factory price of the same source mentioned in the table shall be taken into consideration.

Note: Base Price and source to be filled as per "Bid Form of Table of Price Adjustment Data" in Bidding Forms (Section-IV) after verification by the Employer in case of the alternative provision of Bidder proposed source and base price.

ने. गुण ४०—२०४२
यु.डि.सि. ६२१.६४३.२(६७८.७४२)६९६.११
तेश्रो पुनरिक्षणः २०७३/०९/१९
चौथो पुनरिक्षणः २०७४/१०/०९

नेपाल गुणस्तर

NEPAL STANDARD

हाई डेन्सिटी पोलिथिन पाईप

(खाने पानीको लागि प्रयोग हुने)

नेपाल सरकार
उद्योग मन्त्रालय
नेपाल गुणस्तर तथा नापतौल विभाग

NBSM

काठमाण्डौ, नेपाल ।

नेपाल गुणस्तर परिषद्

Nepal Council for Standardization (NCS)

ने.गुण. ४०–२०४२ हाई डेन्सिटी पोलिथिन पाईप

अध्यक्ष

माननीय श्री परशुनारायण चौधरी, उद्योग, वाणिज्य तथा आपूर्ति मन्त्री

सदस्यहरु

सि.नं.	नाम		संस्था
१.	श्री रविदेव शमा	सह सचिव,	उद्योग मन्त्रालय
२.	डा.श्री प्रकृति शम्शेर राणा	"	कृषि मन्त्रालय
३.	श्री टकवहादुर थापा	"	गृह मन्त्रालय
४.	डा.श्री हिरण्यदेव प्रधान	सि.प.हे. एड	स्वास्थ्य मन्त्रालय
५.	श्री लक्ष्मणदास हाडा	ब.ई.	निर्माण तथा यातायात मन्त्रालय
६.	श्री ईश्वरीमान प्रधान	महानिर्देशक	नापतौल विभाग
७.	डा.श्री देवेन्द्रराज मिश्र	सह प्राध्यापक	त्रिभुवन विश्वविद्यालय
८.	श्री गोविन्द घिमिरे	उप सचिव	वन तथा भू संरक्षण मन्त्रालय
९.	श्री राजवहादुर मिश्र	उप सचिव	राष्ट्रिय पञ्चायतको सम्वन्धित शाखा
१०.	श्री महेशलाल प्रधान	उपाध्यक्ष	नेपाल उद्योग वाणिज्य संघ

सदस्य सचिव

श्री दिनेशराज भट्टराई - निर्देशक, नेपाल गुणस्तर निर्धारण समितिको कार्यालय,

नेपाल गुणस्तर
Nepal Standard

ने.गुण. ४०–२०४२ हाई डेन्सिटी पोलिथिन पाईप

निर्माण तथा विकास सामाग्रीहरु अन्तर्गत हाई डेन्सिटी पोलिथिन पाईप विषयक प्राविधिक उप-समितिका सदस्यहरु :

सि.नं.	नाम	संस्था
१.	श्री रविनलाल चित्रकार	खानेपानी तथा ढल निकास विभाग
२.	श्री स्टालिनमान प्रधान	उद्योग विभाग
३.	श्री भक्तानन्द वज्राचार्य	नेपाल औद्योगिक विकास कर्पोरेसन
४.	श्री लाउरेन्स सर्टसन	युनिसेफ
५.	श्री बिजय गोपाल राजभण्डारी (वैकल्पिक)	
६.	श्री अणकुमार खनाल	नेपाल पोलिथिन एण्ड प्लाष्टिक इं. प्रा.लि.
७.	श्री इ.ऐ.के. गुप्ता	हिमालय प्लाष्टिक प्रा.लि.
८.	श्री एम.भि. थापा (वैकल्पिक	
९.	श्री जगदिश प्रसाद चौधरी	नारायणी प्लाष्टिक प्रा.लि.
१०.	श्री राजेश चौधरी (वैकल्पिक)	
११.	श्री ललितमान श्रेष्ठ	पन्चकन्या प्लाष्टिक प्रा.लि.
१२.	श्री अशोक श्रेष्ठ (वैकल्पिक)	
१३.	श्री रोहित श्रेष्ठ	नेपाल प्लाष्टिक प्रा.लि.
१४.	श्री मनमोहन श्रेष्ठ (वैकल्पिक)	
१५.	श्री रमेश श्रेष्ठ	लक्ष्मी प्लाष्टिक प्रा.लि.
१६.	श्री विष्णु शर्मा	विशेषज्ञ
१७.	श्री त्तासी तेन्जिङ्ग	विशेषज्ञ
१८.	श्री दिनेशराज भट्टराई	निर्देशक, नेपाल गुणस्तर कार्यालय
१९.	श्री विजयकुमार श्रेष्ठ	निरीक्षक, नेपाल गुणस्तर कार्यालय
२०.	श्री उत्तमकुमार कुंवर	केमिष्ट, नेपाल गुणस्तर कार्यालय

बैठक संचालक

श्री दुर्गाबहादुर कार्जित - केमिकल इं. नेपाल गुणस्तर निर्धारण समितिको कार्यालय,

नेपाल गुणस्तर

ने.गुण.४०-२०७४ हाई डेन्सिटि पोलिथिन पाईप

प्राविधिक समितिका सदस्यहरु

१. श्री रोमी मान्नधर, नि. महानिर्देशक ,नेपाल गुणस्तर तथा नापतौल विभाग
२. श्री प्रमोदा प्रधान, उप-महानिर्देशक, नेपाल गुणस्तर तथा नापतौल विभाग
३. श्री गणेश प्रसाद पाठक निर्देशक, नेपाल गुणस्तर तथा नापतौल विभाग
४. श्री आलोक कुमार मिश्र, निर्देशक , नेपाल गुणस्तर तथा नापतौल विभाग
५. श्री मनोज कुमार उपाध्याय, निर्देशक , नेपाल गुणस्तर तथा नापतौल विभाग
६. श्री माधव तिमिल्सिना, अध्यक्ष ,उपभोक्ता अधिकार अनुसन्धान मन्च
७. श्री सुरेन्द्र वैध्य ,ईन्जि.,डि.यु.डि.वि.सि.
८. श्री विरेन्द्र भट्टराई ,HDPE pipe म्यानुफ्याकचरिंग एशोशिएसन
९. श्री सिदार्थ शंकर, ई.अ.सं. .पुल्चोक इन्जिनियरिंग क्याम्पस
१०. श्री कविन्द्र कार्कि, स्थानीय पूर्वाधार तथा कृषि सडक विभाग
११. श्री वैकुण्ठ श्रेठ, वि.एस.ई.टि. नेपाल
१२. श्री मनिष प्रकाश, काठमाडौं बिश्वबिधालय
१३. श्री देवेन्द्र साहु ,पन्चकन्या प्लाष्टिक प्रा.लि..
१४. श्री विजयमान शंकर,काठमाडौं उपत्यका खानेपानी लिमिटेड, त्रिपुरेश्वर
१५. श्री ईश्वर प्रसाद ,खानेपानि सस्थांन
१६. श्री मनीष कर्ण, के. ई., नेपाल गुणस्तर तथा नापतौल विभाग
१७. श्री कृष्ण ब. सोडारी मे.ई. नेपाल गुणस्तर तथा नापतौल विभाग

बैठक संचालक

श्री अनिल शाक्य , निर्देशक, गु. नि.तथा प्र. शा. ,नेपाल गुणस्तर तथा नापतौल विभाग

NBSM

काठमाण्डौ, नेपाल ।

नेपाल गुणस्तर परिषद्

Nepal Council for Standardization (NCS)

ने.गुण.४०-२०७४ हाई डेन्सिटि पोलिथिन पाईप

चौथो पुनरिक्षण

अध्यक्ष

माननिय सुनिल बहादुर थापा, उधोग मन्त्री

उपाध्यक्ष

श्री याम कुमारी खतिवडा, सचिव, उधोग मन्त्रालय

सदस्यहरु

सि.नं.	नाम	पद	संस्था
१.	श्री रिषिराज कोईराला	सह-सचिव	उधोग मन्त्रालय
२.	.....	सह-सचिव	वाणिज्य मन्त्रालय
३.	श्री सुरेन्द्र पसाद सुवेदी	सह-सचिव	विज्ञान तथा प्रविधि मन्त्रालय
४.	.....	सह-सचिव	खाध प्रविधि तथा गुणनियन्त्रण वि.
५.	.....	सह-सचिव	भौतिक पुर्वाधार तथा यातायात मन्त्रालय
६.	श्री डिल्लीराज घिमिरे	सह-सचिव	कानुन तथा संसदीय व्यवस्था मन्त्रालय
७.	श्री सुमनलाल श्रेठ	सह-प्राध्यापक	त्रिभुवन विश्वविधालय
८.	श्री प्रा.डा. दिपक प्रसाद सुवेदी	प्राध्यापक	काठमांडौ विश्वविधालय
९.	श्री जानेन्द्रलाल प्रधान		नेपाल उधोग वाणिज्य महासंघ
१०.	श्री दिपक श्रेठ		नेपाल चेम्बर अफ कमर्स
११.	.....		उपभोक्ता सरोकारवाला संघ संस्था
१२.	श्री सिर्जना बुर्लाकोटी		उपभोक्ता सरोकारवाला संघ संस्था
१३.	श्री अरुणदेव भट्टराई		विज्ञ

सदस्य सचिव

श्री विश्वबाबु पुडासैनी, महानिर्देशक.ने.गु.तथा ना.तौ.वि.

नेपाल गुणस्तर

०.प्रस्तावना

१. नेपाल गुणस्तर (प्रमाण चिन्ह) ऐन २०३७ ले प्रदत अधिकार प्रयोग गरी नेपाल गुणस्तर परिषदबाट गुणस्तर निर्धारण गर्न यस विभागलाई भएको निर्देशन र नीति अनुसार राष्ट्रिय स्तरमा गुणस्तर प्रलेख हरु, तयार पार्ने सिलसिलामा आवश्यक तरिका र ढाचामा यो गुणस्तर प्रलेख तर्जुमा गरी प्रस्तुत गरिएको छ। यसले नेपाल गुणस्तर संग सम्बन्धित सबै पक्षका निमित आवश्यक निर्देशिकाको कार्य गर्ने छ।

२. यो प्रलेख तयार पार्दा गुणस्तर निर्धारणका प्रलेख सम्बन्धका अन्य देशहरुले र अन्तराष्ट्रिय संगठनहरु ले अपनाएका प्रणाली, चलन, तरिका र ढाप्रचालाई यथोचित ध्यानमा राखिएको छ। यसले तर्जुमाको लागि विशेष गरी देहायको विदेशी तथा अन्तराष्ट्रिय संघ संस्थाको प्रलेख तथा अन्य साधानहरु को सहयोग लिइएको छ।

(क) आई.एस.ओ. – इन्टरनेशनल अर्गनाइजेशन फर स्टाण्डर्डडईजेशन
(ख) वि.एस.आई. – ब्रिटिश स्ट्याण्डर्ड ईन्स्टिच्यूसन
(ग) वि.आई.एस. – ब्युरो अफ ईन्डियन स्टाण्डर्ड

३. प्रलेख तयार पार्दा खास ध्यानमा राखिएका बुंदाहरु

३.१ गुणस्तर प्रलेखको तर्जुमा गर्दा अन्य प्रलेखको कुनै पनि परिच्छेदको उलंघन हुन नजाओस भनि यथासक्य होसियारी राखिएको छ। असावधानीवाट केही उलंघन हुन गएको ज्ञात हुन आएमा यसमा चाहिने संशोधनको लागि यथाशिध्र कदम उठाईने छ।

३.२ देशको ऐन नियम अन्तरतग परेको सबै बुंदाहरु लाई यथोचित मान्यता दिई यसको कुनै द्फा तथा परिच्छेदको उलंधन नहुने गरी यो गुणस्तर प्रलेख तयार पार्ने कोशिस गरिएको छ। कथंकदाचित गुणस्तर प्रलेखको कुनै भागमा उल्लेखित कुराहरु हाल प्रचलनमा भएका तथा भविष्यमा आउने ऐन नियम संग बाझिन गएमा त्यस्ता (प्रलेख) का कुराहरु, स्वतः निस्कृय हुनेछ।

३.३ नापतौल ईकाइ तथा तिनीहरुको, पान्तर गर्दा स्टान्डर्ड नापतौल ऐन अन्तरगंत जे जति नियमहरु छन् सबैलाई यथोचित मान्यता दिई यिनीहरुको प्रयोग गरिएको छ

३.४ यस प्रलेखको तर्जुमा ने.गु. तथा आई.एस.आई. र त्यस्तै अन्य अन्तराष्ट्रिय संघ संस्थाहरु का सम्बन्धित विषयमा निर्देशिका पुस्तीका तथा गुणस्तर निर्धारण र गुण नियन्त्रण सम्बन्धी अन्य कार्यहरुको प्रतिवेदन ईत्यादिबाट सामाग्रिहरु यथासम्भव प्राप्त गरी तिनीहरु को सिफरिस अनुरुप सामान्जस्य ल्याउन खोजिएको छ।

३.५ यस प्रलेखको तर्जुमा गर्दा नापनतौल इत्यादि विभिन्न ईकाईहरुको लागि अन्तराष्ट्रिय क्षेत्रमा चलि रहेको वहुमान्य ईकाई तथा आई.यस.ओ ले समेत सिफरिस गरेको एसाआई इकाई प्रणालीलाई यथासम्भव प्रयोगमा ल्याएको छ।

४. देशको सर्वाङ्गिण बिकासको क्रममा खाने पानीको लागि प्रयोग हुने हाइडेन्सिटी पोलिथिन पाईपले महत्वपूर्ण स्थान ओगटदै आएको कुरा सर्वविदितै छ । हाईडेन्सिटी पोलिथिन पाईप अधातुका पाईपहरु को तुलनामा कैयन गुना हलुंगो हुनाको साथै खिया नलाग्ने एवं ढुवानी गर्न सजिलो भएकोले यसको प्रयोग दिन प्रति दिन बढदै गैरहेको पाइएको छ । हाल देश भित्र आधुनिक प्रविधि अपनाई पाईपहरु उत्पादन गर्ने धेरै उद्योगहरु स्थापना पनि भै सकेका छन । ती उद्योगहरु द्धारा उत्पदित पाइपहरुको कार्य सम्पादन गुणमा एकपता ल्याउनका साथै उपभोक्तावर्गले चाहेको विभिन्न आवश्यकता अनुप बनाउनको लागि यस गुणस्तर प्रलेखको तर्जुमा गर्न आवश्यक हुन आएको छ ।

५. यस गुणस्तर प्रलेख २०४० सालमा पहिलो चोटी प्रकाशन भएको थियो । सो प्रलेखमा भएका विभिन्न त्रुटिहरु हटाउन र उत्पादकहरु र खरीदकर्ताहरु आवश्यकता हरुलाई पूर्ति गर्नु यस पहिलो संशोधित प्रलेखको आवश्यकता हुन आएको हो । उत्पादकहरु र खरीदकर्ताको सुझावहरु लिई यस प्रलेखलाई पहिलो संशोधन गरिएको हो ।

६. यस गुणस्तर प्रलेखमा उल्लेखित आवश्यकताहरु अनुरुप छ वा छैन भन्ने कुरा निश्चित गर्न गरिएको परिक्षण वा विश्लेषणको नतिजा प्रस्तुत गर्न संस्थाहलाई राउण्डिङ्ग अफ (Rounding of Numerical Values) गर्दा नेगुण नं.१७ अनुसार गरिनु पर्दछ ।

७. यस गुणस्तर प्रलेखमा हाईडेन्सिटी पोलिथिन पाइपको विवरण सम्बन्धि प्राविधिक पक्षलाई मात्र समावेश गरिएको छ । कारोबार सम्बन्धि कुराहरु यस प्रलेखको क्षेत्र भित्र पर्दैनन् ।

१. क्षेत्र

यस गुणस्तर प्रलेखमा खानेपानीको लागि प्रयोग हुने हाईडेन्सिटी पोलिथिन पाईपका निम्न विषयहरुमा आधिकारिक निर्देशनहरु दिईन्छन ।

(क) वर्गीकरण,

(ख) आवश्यकताहरु,

(ग) परीक्षण विधिहरु

(घ) निर्णायकका आधारहरु

सम्बन्धित उद्योगद्वारा समेत परीक्षण गरि गुणस्तर यकिन गरी सकेपछि कच्चापदार्थ प्रयोग भएको

व्याच नं .समेतको अभिलेख राख्नु पर्नेछ ।

२. नामाकरण तथा वर्गीकरण

पाईपहरुको वर्गीकरण ३०° से.ग्रे. को आधारमा हुने निम्नलिखित वर्किङ प्रेसरहरु लिइएका छन् ।

२.१ पाईपको नामाकरण गर्दा कच्चा पदार्थको ग्रेड (वर्ग) प्रेशर रेटिङ्ग (Pressure rating PN) र नामाङ्कित बाहिरी व्यास (Nominal outside Diameter ; DN) लाई आधार बनाउनु पर्दछ । उदाहरणको लागी PE- 63, PN 2.5, DN -50 भन्नाले ग्रेड ६३को कच्चा पदार्थ प्रेशर रेटिङ्ग 0.25 MPa (2.5 Kgf/cm^2) र बाहिरको नामाङ्कित व्यास ५० मि.मि. भन्ने बुझिन्छ ।

२.२ पाईप बनाउने पदार्थको ग्रेडिङ्ग गर्दा पदार्थको न्युनतम आवश्यक क्षमता (Minimum required strength, MRS)को आधारमा तालिका **संख्या** -० अनुसार गरिनेछ ।

तालिका संख्या -०

क.स.	पदार्थको ग्रेड	MRS(MPa) Maximum required strength at 20 ^{0} C for 50 years	Maximum allowable hydrostatics design stress(@,(MPa*)	
			At 20 ^{0}C	At 30 ^{0}C
१.	PE-63	6.3	5.0	4.0
२.	PE-80	8.0	6.3	5.0
३.	PE-100	10.0	8.0	6.3

*नोटः १कि.ग्रा.से.मी.^{२}=०.१ मे.पा.(मेगा पास्कल)को आधारमा ।

२.३ कच्चा पदार्थको ग्रेडिङ्ग सम्बन्धमा आपूर्तिकर्ता (suppliers) बाट प्राप्त सुचना

२.४ प्रेशर रेटिङ्ग (Pressure rating , PN) को आधारमा पाईपलाइ निम्नानुसार वर्गीकरण गर्न सकिनेछ ।

पि.एन.-२.५	०।२५ (२.५ के.जी/से.मी.^{२})
पि.एन.-४.०	०.४ (४.० केजी/से.मी.^{२})
पि.एन.-६.०	०.६ (६.० के.जी/से.मी.^{२})
पि.एन.-१०.०	१.० (१०.०के.जी/से.मी.^{२})
पि.एन.१२.५	१.२५ (१२.० के.जी/से.मी.^{२})
पि.एन.१६.०	१. ६० (१६.०के.जी/से.मी.^{२})

२.४.१ पाईपको वर्किंग प्रेशरगणना गर्दा ३० ^{o} से.ग्रेड कालागि प्रेशर कोफिसिएन्ट १ मानिएको छ । सोभन्दा फरक तापक्रम कालागि चित्र सं १ बमोजिम सम्बन्धित कोफिसिएन्टको आधारमा वर्किंग प्रेशर गणना गर्नु पर्नेछ । (साविकको रेखाचित्र नं १ लाई नयां चित्र १ द्वारा प्रतिस्थापित गरिएको ।)

चित्र संख्या :-१

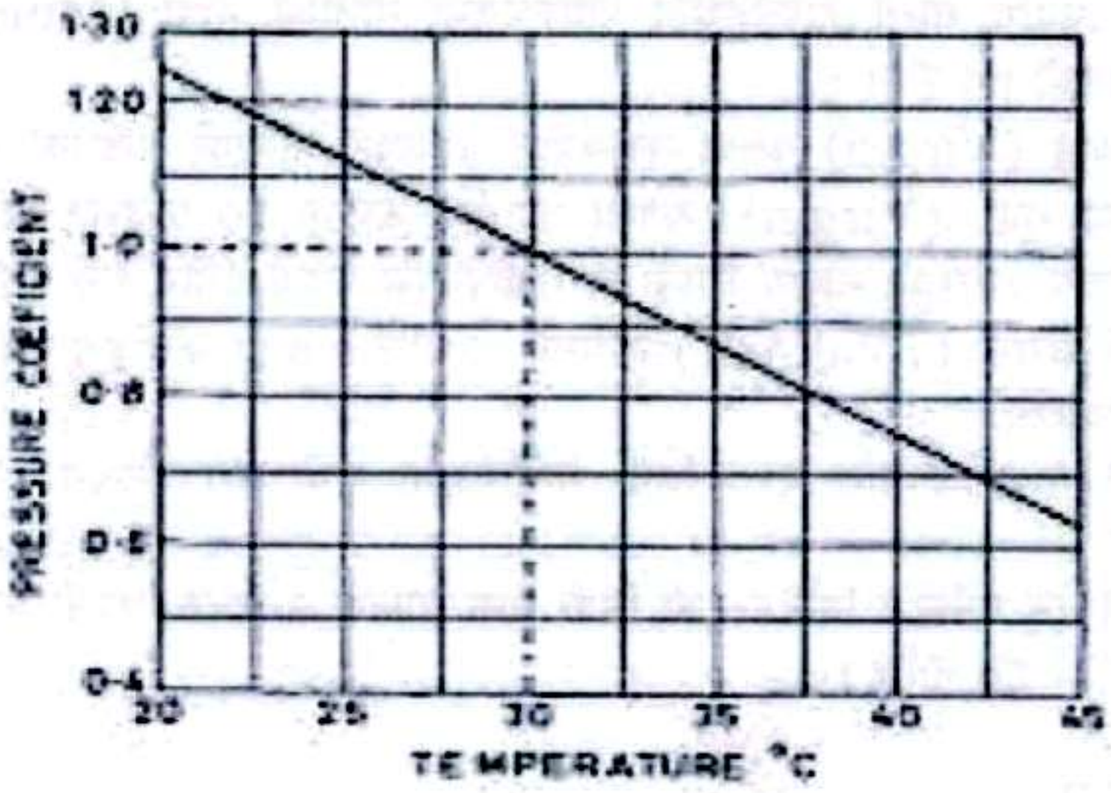


Fig. 1 Pressure Coefficient versus Temperature

२.५ नामाङ्कित व्यास (Nominal Diameter, DN)

निम्नानुसार व्यास भएका पाईपहरु सम्बन्धि निर्देशनहरु यसमा समेटिएका छन । १६ मि.मि.,२० मि.मि.,२५ मि.मि,३२ मि.मि.,४० मि.मि., ५० मि.मि.,६३ मि.मि. ७५ मि.मि., ९० मि.मि. ११० मि.मि., १२५ मि.मि.,१४० मि.मि., १६० मि.मि., १८० मि.मि., २०० मि.मि.,२२५ मि.मि., २५० मि.मि., २८० मि.मि., ३१५ मि.मि., ३५५ मि.मि., ४०० मि.मि., ४५० मि.मि., ५०० मि.मि., ५६० मि.मि., ६३० मि.मि., ७१० मि.मि., ८०० मि.मि., ९०० मि.मि., १००० मि.मि. सम्म ।

३. आवश्यकता (Requirements)

३.१ कच्चा पदार्थ (Raw material)

३.१.१ पाईप वनाउनमा प्रयोग गरिने कच्चा पदार्थ हाइडेन्सिटी पोलिथिनको घनत्व (Density) न्यूनतम ०.९४० ग्राम/ से.मि.^{3} हुनु पर्ने छ।

३.१.२ पाईप उत्पादनमा प्रयोग गरिने हाईडेन्सिटी पोलिथिना राखिने स्टेबिलाइजर (Stabilizer) , एन्टी अस्कीडान्ट आदि स्वास्थ्यलाई हानिकारक हुने किसिमको हुनु हुँदैन र यो खाद्य ऐन ले तोकेको सीमा भित्र हुनु पर्ने छ। एन्टी अस्कीडान्टको मात्रा पदार्थको कुल तौलको ०.३% भन्दा बढी हुनु हुदैन ,साथै ती एन्टी अक्सीडेन्ट हरु आई.एस.ओ.१०१४१/१९८२ ले निर्देशित गरे बमोजिम हुनु पर्नेछ।

३.१.३ पाइप उत्पादन गर्न प्रयोग गरिने हाइडेन्सिटी पोलिथिनमा राखिने कार्वन ब्लाकको मात्रा २ देखि ३ प्रतिशत सम्म मात्र हुनेछ र यो पोलिमराई जेशनको समयमानै राखेको हुनु पर्दछ। कार्वन ब्ल्याक रोजिनमा समान ,पले मिश्रित हुनु पर्नेछ सोको प्राइमरी पार्टिकल साइज १० देखि २५ न्यानोमिटरको हुनु पर्नेछ।

३.१.४ पाईप उत्पादन गर्न प्रयोग गरिने हाइडेन्सिटी पोलिथिनको मेल्ट फ्लो रेट (Melt Flow Rate) ०.४ देखि १.१ग्राम / १० मिनेट (५किलो ग्रम राखेमा) को विचमा हुनु पर्नेछ।

३.१.५ पाईप उत्पादन गर्न प्रयोग गरिने हाइडेन्सिटी पोलिथिनमा पानीको मात्रा (Moisture) ०.१ प्रतिशत भन्दा बढी भएको हुनु हुदैन।

३.१.६ उत्पादक आफ्नैको शुद्ध (Virgin) कच्चा पदार्थबाट उत्पादन गरिएको पाइपको स्क्राप रिवर्क (Rework) को,पमा शुद्ध (Virgin) कच्चा पदार्थमा वढीमा १० प्रतिशत सम्म मिसाउन सकिनेछ। कुनै पनि अन्य प्रकारको स्क्राप/ रिवर्क वा रिसाइकल्ड पदार्थ प्रयोग गर्न पइने छैन।

३.१.७ कच्चा पदार्थमा रहेको खरानी (Total Ash) कोमात्रा (०.५%) भन्दा कम हुनु पर्नेछ।

३.२ पाईप (सामान्य आवश्यकता)

३.२.१ पाइपहरु २०० डिग्री सेन्टीग्रेड देखि २२० डिग्री सेन्टीग्रेडमा राम्रो संग वेल्डिंग (Welding) हुनु पर्नेछ।

३.२ पाईपहरु कालो रंगको हुनु पर्नेछ र यिनीहरु को भित्री तथा वाहिरी सतहहरु चिल्लो एवं निम्न त्रुटीहरु कुनै पनि नभएको हुनु पर्नेछ।

(क) लम्वाई तर्फ कोरिएको

(ख) चर्केको ठाउँह (Cracks)

(ग) वाङ्गेको (Twisted) ठाउँह

नोट २ : पाईपहरु को घेराको मोटाई हरु ३०° से.मा तिन वटै ग्रेडका लागि कमशः ४.० ,५.० तथा ६.३ मे.पा. को सुरक्षित वर्किङ्ग प्रेसरमा आधारित छन्। उच्च तापक्रम हरुमा वर्किङ्ग प्रेसर घट्दै जाने हुन्छन्।

३.३ पाईपका नाप परिमाण (Dimensions of Pipes)

३.३.१ पाईपहरु को बाहिरी व्यास (Out side diameter) र तिनीहरुको घेराको मोटाई (Wall thickness) तालिका नं. १ (क), १(ख) तथा १ (ग) मा दिए अनुसार हुनु पर्नेछ।

३.३.२ ११० मि.मि. सम्मको बाहिरी व्यास भएको पाईपको लागि पाइपहरु को व्यासरु आपसमा समकोण हुने गरी लिईएको दुई नापहरु को औसत व्यासलाई लिईनु पर्दछ। ११० मि.मि. भन्दा बढी व्यासका पाईपहरु को लागि सर्कमफेरेन्स (Circumference) लाई ३.१४२ ले भाग गरि ०.१ सम्मको शुद्धता (Round off to nearest) मा राखी लिइन्छन।

सर्कमफेरेन्स नाप्नको लागि लचिलो टेप (Flexible tape) प्रयोग गरिन्छ । अथवा सर्कमफेरेन्सलाई ३.१४२ ले पहिले नै भाग गरि निकाली मिलाई राखेको Circummeter (π- Tape) प्रयोग गरे पनि पाइपको बाहिरी व्यास नाप्न सकिन्छ । घेराईको मोटाई नाप्न छेउमा बल भएको बल माइक्रो मिटर अथवा डायल मेटल प्रयोग गर्न सकिन्छ । यसरी नाप परिमालाई ०.१ मिमि सम्म व्यक्त गरिनु पर्दछ ।

३.३.३ ओभालिटि (Ovality)

पाइपको बाहिरी व्यास समकोण पारी दुई ठाउँमा नाप्दा परिमाणमा फरक आउने नापि (Ovality) सो पाईपको आवश्यक न्यूनतम मोटाइको नाप परिमाण (Minimum) भन्दा बढी हुनु हुँदैन । π - Tape प्रयोग गरी बाहिरी व्यास नाप्दा ovality भएको थाहा नहुने हुँदा, ovality नाप्न भर्नर क्यालिपर (Vernier calliper) अथवा सो कार्यमा उपयुक्त अन्य स्वीकृत उपकरण प्रयोग गर्न सकिन्छ ।

३.४ पाईपको तौल (Weight of pipe)

पाईपको तौल सम्बन्धि जानकारी Annex -A मा उल्लेख गरिएको छ । सो Annex -A जानकारी कोलाग मात्र हुनेछ ।

४ कार्य सम्पादन सम्बन्धी आवश्यकताहरु

४.१ हाइड्रोलिक चारित्रिक गुणहरु (Hydraulic Characteristics)

परिशिष्ट (क) मा उल्लेखित परीक्षण विधि अनुसार इन्टरनल क्रीप रप्चर (Internal creep rupture) परीक्षण गर्दा, पाईपहरु को कुनै पनि ठाउँमा फुलेको, चुहिएको, अथवा टप–टपाएको हुनु हुँदैन र साथै परीक्षणको अवधि भरीनै पाईपहु फुटन हुदैन । सो परीक्षण गर्न परीक्षण भार (Stress) , परीक्षण तापक्रम, परीक्षण अवधि समय आदि तालिका नं. २ मा दिए अनुसार हुनु पर्नेछ ।

तालिका नं २

परीक्षण	इन्टरनल प्रेशर creep-rupture test कोलागि आवश्यकता ह				
	परीक्षण तापक्रम ^0C	न्युनतम अवधि घण्टा	परीक्षण भार मेापा (Induced stress in MPa)		
			PE-63	PE-80	PE-100
टाईप	८०	१६५	३.५	४.६	५.५
स्वीकार्य	८०	४८	३.८	४.९	५.७

४.२ रिभर्सन टेप्ट (Reversion Test) परिशिष्ट (ख) मा उल्लेख भएको परीक्षा विधि अनुसार रिभर्शन टेप्ट गर्दा पाइपको लम्बाईमा आउने अन्तर ३ प्रतिशत भन्दा बढी हुनु हुँदैन

४.३ आभर अल माईग्रेशन परीक्षण (Overall Migration Test)

४.४ घनत्व (Density)

४.५ मेल्ट फ्लो रेट (Melt Flow Rate)

४.६ कार्बन ब्ल्याक कन्टेन्ट (Carbon Black Content and Disperson)

४.७ खरानीको मात्रा (Ash Content)

प्रत्येक ब्याचको HDPE पाईप माथी उल्लेखित चारित्रकगुण हको सम्बन्धित परीक्षण विधि अनुसार परीक्षण गर्दा परीक्षण नतिजा तोकेको मापदण्ड अनुसार हुनु पर्नेछ ।

५. भण्डारण तथा पाईपहरुको आपूर्ति (Supply of pipes and storage)

५.१ पाईपहरु क्वाइलमा वा सिधा तन्किएको,पमा आपूति गर्न सकिने छ । ६३ मि.मि. सम्म व्यास भएको पाइपह क्वाइलमा आपूर्ति गुर्न पर्नेछ । भण्डारण गर्ने कोठा सफा सुख्खा तथा गिर्खा तथा तिखा वस्तुहरु नभएको हुनुपर्छ । पाईपलाई तह-तह बनाएर दुई मीटर सम्ममको चाङ्गमा तेल, अर्गानिक सोलभेन्ट नपर्ने गरि राख्नु पर्छ । पाईपहरु को क्वाईलको भित्री व्यास सो पाइपको बाहिरी व्यासको भन्दा घटीमा २५ गुणा ठूलो हुनु पर्ने छ । ६३° मिमि भन्दा वढी व्यास भएका पाइपहरु लम्बाईमा आपूर्ति गर्नु पर्नेछ । "पि.ई.- ६३ बाट निर्मित पाईपहरु का लागि"आपूर्ति गर्ने पाईपहरुको

लम्वाई "साधारणतया" निम्न तालिका नं. ३ मा दिए अनुसार हुनेछ । खरिद कर्ता र उत्पादकको विचमा सम्झौता भए "अनुसारको लम्वाई राखी" पाईप क्वाईलमा अथवा लम्वाई आपूर्ति गर्न सकिने छ । यसरी पाईप आपूर्ति गर्दा, पाइपहरुको हरेक छेउ सिलिङ्ग प्लग (Sealing plug) प्रयोग गरि अथवा वेल्डीङ्ग गरि बन्दगरिएको हुनु पर्नेछ ।

तालिका संख्या - ३

पाईपको बाहिरी व्यास मि.मि.मा	प्रेशर रेटिङ्ग	आपूर्ति गर्ने किसिम	लम्वाई मिटरमा
१६	पि.एन.-१०,१२.५,१६	क्वाइलमा	३००
२०	पि.एन.-१०,१२.५,१६	क्वाइलमा	३००
२५	पि.एन.-१०,१२.५,१६	क्वाइलमा	३००
३२	पि.एन.-१०,१२.५,१६	क्वाइलमा	२००,१००
४०	पि.एन.-४,६,१०,१२.५,१६	लम्वाइ,क्वाइल, क्वाइलमा	५,१००,१००
५०	पि.एन.-४,६,१०,१२.५,१६	लम्वाइ,क्वाइल, क्वाइलमा	५,१००,५०
६३	पि.एन.-२.५४,६,१०,१२.५,१६	लम्वाइ, लम्वाइ क्वाइल,क्वाइलमा	५,५,५०, २५
७५			
९०			
११०			
१२५			
१४०			
१६०			
१८०			
२००			
२२५			
२५०			
२८०			
३१५			
३५५			
४००			
४५०			
५००			
५६०			
६३०			
७१०			
८००			
९००			
१०००			

६३ मि.मि. भन्दा माथीका सवै साईजका पाईपहरु साधारणतया ५-५मिटरको लम्वाईमा आपूर्ति हुनेछ ।

६. नमुना लिने तथा परीक्षण (Sampling and test)

६.१ टाइप परीक्षण (Type Test)

कच्चा पदार्थको अवयव (Composition) मा फरक आउँदा उत्पादन गर्ने प्रविधि फरक हुँदा नयाँ साईज र सिरिजको पाईप उत्पादन गर्दा टाईप परीक्षण गर्नु जरी हुन आउँछ । यदि माथि उल्लेखित कुनै पनि कुरामा फरक आएन भने, एक चोटी मात्र टाईप परीक्षण गरि सो को रिकर्ड खरिदकर्ताले माग गरिएको खण्डमा उत्पाकको उपलव्ध गराउनु पर्नेछ ।

६.१.१ टाईप परीक्षण गर्नुको निम्ति विभिन्न व्यासका ३ वटा पाईपका टुत्राहरु खेपबाट छान्नु पर्नेछ ।

६.१.२ यसरी लिइएका ३ वटा पाईपका टुत्राहरु लाई तालिका नं। २ को क्वालिटी टेष्ट परीक्षणमा उल्लेख

भएको परीक्षण तापक्रम, परीक्षण अवधि र भार अनुसार क्रिप रपचर परीक्षण गरिन्छ। "यदि ३ वटै नमुनाहरुले कम्तीमा वर्षको एक पटक परीक्षण गर्दा क्वालिटी टेस्टको आवश्यकता पुरा गर्दछ भने , ती नमुनाहरु टाइप टेस्टमा उत्तीर्ण भएको मानिने छ।"

६.१.३ यदि पहिलो चोटीको सो परीक्षणमा कुनै पनि नमुना फेल भएको खण्डमा, अर्को ३ वटा नमुनाहरु लिइनु पर्दछन्। र सो नमुनाहरु फेरि परीक्षण गरिन्छन। यस परीक्षणमा यदि कुनै पनि नमुना फेल भएन भने सो नमुनाहरु टाईप टेष्टमा पास भएको मानिने छन। यदि सो परीक्षणमा कुनै पनि नमुना फेल भएको खण्डमा टाइप परीक्षणमा फेल भएको मानिने छ। यन अवस्थामा उत्पादकले आफ्नो पाइपको गुणस्तर बढाई पछि फेरी टाइप टेष्ट पास गराउन नमुनाहरु उपलब्ध गराउनु पर्नेछ।

६.१.४ टाईप परीक्षण पास भएको एक वर्ष पछि फेरि नमुनाहरु टाईप टेष्ट स्वीकृत (Type test approval) को लागि परीक्षण गर्नु पर्नेछ।

६.२ आक्सेप्टेन्स परीक्षण (Acceptance Test)

६.२.१ खेप (Lot)

एउटै कन्साईनमेन्ट (Consignment) का कच्चा पदार्थ, एउटै प्रविधि र अवस्थामा उत्पादन गरिएका एउटै साईज र लम्बाईका सबै पाईपहरु बाट एक खेप बनईन्छ।

६.२.२ खेप गुणस्तर अनुरुप एको निर्णय गर्न हरेक खेपबाट छुट्टै छुट्टै नमुनाहरु लिई परीक्षणहरु गर्नु पर्नेछ।

६.२.३ दृष्टिगत तथा नाप परीमाण आवश्यकताहरु (Visula anDimensionalRequirements)

६.२.३.१यस परीक्षणको लागि लिइने नमुनाहरुको संख्या तालिका नं. ४ अनुसार हुनु पर्नेछ। र खेपबाटनमुना अक्रमबद्ध संख्या तालिका (Random number Table) अनुसार अक्रमबद्ध तरीका(RandomMethod) बाट लिइनु पर्नेछ।

६.२.३.२ निर्णायक आधार :

तालिका नं. ४ कलम ३ अनुसार पाईपहरुको पहिलो नमुना लिईन्छ र यिनीहरुको दृष्टिगत र नाप परीक्षण दफा ३.२ र ३.३ का आवश्यकताहरु अनुसार परीक्षण गरिन्छ। यदि यस परीक्षणमा फेल भएको नमुनाहरुको संख्या तालिका नं. ४ को कलम नं. ५ मा दिइएको बराबरी अथवा त्यो भन्दा कम भयो भने, नमुना लिएको सो खेप पास भएको मानिने छ र यदि फेल भएको नमुनाको संख्यातालिका नं. ४ को कलम नं. ६ मा दिइएका बराबरी अथवा त्यो भन्दा बढी भयो भने सो नमुना लिएको खेप यस गुणस्तर अनुरुप नभएको मानी फेल गरिन्छ। यदि सो फेल भएको पहिलो नमुनाको संख्या तालिका नं. ४ को कलम नं। ५ अक्सेप्टेन्स संख्या र कलम नं. ६ रिजेक्सन संख्याको बीचमा भयो भने, तालिका नं. ४ को कलम नं. ३ मा दिइए अनुसारको संख्याको दोश्रो नमुना लिईनु पर्नेछ। सो दोश्रो नमुनाको संख्याहरुकोपनि सोहि अनुसार दृष्टिगत र नाप परिमाणहरुको परीक्षण गरिन्छ। यी दुवै जोड (पहिलो र दोस्रो) नमुनाहरु (Cumulative Number) को परिक्षणमा सफल नमुनाहरुको संख्या यदि तालिका नं। ४ को कलम नं.५ मा दिएको संख्या बराबर अथवा त्यो भन्दा कम भयो भने, खेप पास भएको मानिने छन , अन्यथा गुणस्तर अनुरुप नभएको मानी फेल गरिन्छ।

तालिका नं.४

दृष्टिगत र नाप परीक्षणका आवश्यकताहरु बारे परीक्षण गर्न नमुनाको संख्या

खेप साईजहरुको संख्या (१)	नमुना सख्या (२)	नमुनाको साईज (३)	जोड नमुनाको (४)	अक्सेप्टेन्स संख्या (५)	रिजेक्सन संख्या (६)
० देखि २५ सम्म	–	१	–	–	–
		१			
२६ देखि ५० सम्म	–	२	–	–	–
		२			
५१ देखि १५० सम्म	–	३			–

		३			
१५१ देखि ३०० सम्म	–	४	–	–	–
		४			
३०१ देखि ५०० सम्म	–	५	–	–	–
	–	–	–	–	–
५०१ देखि १००० सम्म	पहिलो	८	८	०	२
	दोश्रो	८	१६	१	२
१००१ देखि ३००० सम्म	पहिलो	१३	१३	०	२
	दोश्रो	१३	२६	१	१
३००१ देखि माथि	पहिलो	२०	२०	०	२
	दोश्रो	२०	४०	१	२

५०० सम्मको लट साईजमा लिइएका नमुनाहरु सबै पास भएको हुनु पर्नेछ । कुनै पनि नमुना फेल भएको हुनु हँदैन

➢ Cumulative

६.२.४ रिभर्सन परीक्षण (Reversion Test)

६.२.४ दृष्टिगत र नाप परीक्षण परीक्षणमा पास भएका खेप रिभर्सन परीक्षणको लागि परीक्षण गरिन्छ ।

६.२.४.२ निर्णायक आधार (Criteria For Acceptance)

यस परीक्षणको लागि खेपबाट ३ वटा पाईपका टुक्राहरु नमुनाको रुपमा लिइन्छ । यदि यस परीक्षणमा कुनै पनि नमुना फेल भएन भने खेप परीक्षणमा पास भएको मानिने छ । यदि एउटा मात्र नमुना फेल भएको खण्डमा फेरि ३ टुक्रा पाइपहरु दोश्रो नमुनाका रुपमा लिइन्छ र सोही परीक्षण पुन : गरिन्छ । यदि यस दोश्रो परीक्षणमा कुनै पनि नमुना फेल भएन भने, खेप गुणस्तर अनुसार भई पास भएको मानिने छ । अन्यथा फेल मानिनेछ ।

६.२.५ हाइड्रोलिक परीक्षण (Hydraulic Test)

दफा ६.२.३ र ६.२.४ का आवश्यकताहरु पूर्ति गरिएका खेपलाई पुनः हाइड्रोलिक परीक्षण गर्नु पर्नेछ ।

६.२.५.१ खेपमा रहेका पाइपहरु तालिका नं. २ को आक्सेप्टेन्स टेष्टको आवश्यकताहरु अनरुप छ छैन निश्चय गर्न गरिने परीक्षणको लागि लिइने नमुनाको संख्या निम्न तालिका नं. ५ अनुसार हुनु पर्नेछ ।

तालिका नं. ५

हाईड्रोलिक परीक्षणको लागि लिइने नमूनाको संख्या

खेपमा	नमुनाको
पाइपको संख्या	साइज (संख्या)
(१)	(२)
३०० सम्म	२
३०१ देखि १०००	३
१००१ देखि माथि	५

६.२.५.२ यस परीक्षणको लागि च्याण्ड नम्बर टेबल (Random Number Table) प्रयोग गरि अक्रमबद्ध तरीका अपनाई खेपबाट नमुनाहरु लिइनु पर्दछ ।

६.२.५.३ **निर्णयक आधार (Criteria of Acceptance)**

तलिका नं ५ मा उललेख भए अनुसार खेपबाट लिईएका नमुनाहरु दफा नं ४. अनतर्गतका प्रावधानहरु internal pressure creep rupture strength, overall migration, density, melt flow rate,carbon content and dispersion तथा ash content सम्बन्धि आवश्यकताहरु परीक्षणगर्दा यदि लिइएका कुनै पनि नमुना, उल्लेखित परीक्षणमा सफल भएमा सो खेप गुणस्तर अनुरुप भएको मानिने छ।

७. चिन्ह लगाउने (Marking)

७.१ प्रत्येक पाईपको क्वाइल वा लम्बाइमा एक मिटरको फरकमा Hot Embosed वा Engrave गरी (engrave depth ०१ मिमि भन्दा वढि नहुने गरि) कमश: उत्पादकको नाम , ट्रेडमार्क, पदार्थको ग्रेड , पाईपको प्रेशर रेटिङ्ग, र घान (ब्याच) संख्या, गुणस्तर पमाण चिन्ह (प्राप्त गरेको भए) ,क्वायलिङ्ग पाईपमा मिटर काउन्टिङ्ग तथा उत्पादक र उपभोक्ता विचको सम्झौता भए अनुसार उल्लेख गर्नु पर्ने कुरा भए सो समेत स्पष्ट संग वुझिने गरी अंकित गरिएको हुनु पर्छ।

७.२ दफा ७.१ मा उल्लेख भएका कुराहरु निम्न उल्लेख गरिए अनुसार रंग हरुवाट अंकित गरिएको हुनु पर्नेछ।

पाईपको प्रेशर रेटिङ्ग	रङ्ग
पि.एन.-२.५	रातो
पि.एन.-४.०	निलो
पि.एन.-६.०	हरियो
पि.एन.-१०.०	पहेलो
पि.एन.-१२।५	वैगनी
पि.एन.-१६।०	सेतो

प्रत्येक पाईपमा समान दुरीमा कम्तीमा तीनवटा ३ मि.मि. चौडाई भएको **उपदफा ७.२** मा तोकेको रङ्ग को रेखा हुनु पर्नेछ।

तालिका संख्या -१ (क)

कच्चा पदार्थ पिाई-६३ कोलागी।

पाईपको व्यास मिमिमा		पाईपको घेराको मोटाई (मि.मि.मा)											
		पि.एन.२.५		पि.एन. ४		पि.एन. ६		पि.एन.१०		पि.एन.१२.५		पि.एन.१६	
न्यू.	अ.	न्यू.	अ.	न्यू.	अ.	न्यू.	अ.	न्यू.	अ.	न्यू.	अ.	न्यू.	अ.
16.00	16.30	—	—	—	—	2.30	2.80	2.30	2.80	2.80	3.30	3.40	4.00
20.00	20.30	—	—	—	—	2.80	3.30	2.80	3.30	3.40	4.00	4.20	4.90
25.00	25.30	—	—	—	—	3.50	4.10	3.60	4.20	4.40	5.10	5.40	6.20
32.00	32.30	—	—	—	—	4.40	5.10	4.50	5.20	5.50	6.30	6.70	7.60
40.00	40.40	—	—	2.00	2.40	5.30	6.10	5.60	6.40	6.80	7.70	8.40	9.50
50.00	50.50	—	—	2.40	2.90	6.30	7.20	7.00	7.90	8.60	9.70	10.50	11.80
63.00	63.60	2.00	2.40	3.00	3.50	7.70	8.70	8.40	9.50	10.20	11.50	12.50	14.00
75.00	75.70	2.30	2.80	3.60	4.20	8.80	9.90	10.00	11.20	12.20	13.70	15.00	16.70
90.00	90.90	2.80	3.30	4.30	5.00	9.80	11.00	12.30	13.80	14.90	16.60	18.40	20.50
110.00	111.00	3.40	4.00	5.30	6.10	11.20	12.60	13.90	15.50	16.90	18.80	20.90	23.20
125.00	126.20	3.80	4.40	6.00	6.80	12.60	14.10	15.60	17.40	19.00	21.10	23.40	26.00
140.00	141.30	4.30	5.00	6.70	7.60	14.00	15.60	17.80	19.80	21.70	24.10	26.70	29.60
160.00	161.50	4.90	5.60	7.70	8.70	15.70	17.50	20.00	22.20	24.40	27.10	30.00	33.20
180.00	181.70	5.50	6.30	8.60	9.70	17.50	19.50	22.30	24.80	27.10	30.10	33.40	37.00
200.00	201.80	6.10	7.00	9.60	10.80	19.60	21.80	25.00	27.70	30.50	33.80	37.50	41.50
225.00	227.00	6.90	7.80	10.80	12.10	22.00	24.40	27.80	30.80	33.80	37.40	41.70	46.10
250.00	252.30	7.60	8.60	12.00	13.40	24.80	27.50	31.20	34.60	37.90	41.90	46.70	51.60
280.00	282.60	8.50	9.60	13.40	15.00	28.00	32.40	35.00	38.70	42.60	47.10	52.50	58.00
315.00	317.90	9.60	10.80	15.00	16.70	31.40	36.40	39.50	43.70	48.00	53.00	59.20	65.40
355.00	358.20	10.80	12.10	17.00	18.90	34.90	40.40	44.50	51.40	54.10	62.50	—	—
400.00	403.60	12.20	14.30	19.10	22.20	39.10	45.20	50.00	57.70	—	—	—	—
450.00	454.10	13.70	16.00	21.50	25.00	44.00	50.80	55.60	64.20	—	—	—	—
500.00	504.50	15.20	17.70	23.90	27.70	49.60	57.30	—	—	—	—		
560.00	565.00	17.00	19.80	26.70	31.00	55.90	64.50	—	—	—	—	—	—
630.00	635.70	19.10	22.20	30.00	34.70	—	—	—	—	—	—	—	—
710.00	716.40	21.60	25.10	33.90	39.20	—	—	—	—	—	—	—	—
800.00	807.20	24.30	28.20	38.10	44.10	—	—	—	—	—	—	—	—
900.00	908.10	27.30	31.60	42.90	49.60	—	—	—	—	—	—	—	—
1000.00	1009.00	30.40	35.20	47.70	55.10	—	—	—	—	—	—	—	—

नोट १ : न्यू = न्यूनतम, अ = अधिकतम

तालिका संख्या -१ (ख)

हाईडेन्सिटी पोलिथिन पाईपहरुको नाप परिमाणहरु

कच्चा पदार्थ **पिाई-८०** को लागी।

पाईपको व्यास मि.मि.मा		पाईपको घेराको मोटाई (मि.मि.मा)											
		पि.एन.२.५		पि.एन .४		पि.एन .६		पि.एन .१०		पि.एन.१२.५		पि.एन.१६	
न्यू.	अ.	न्यू.	अ.	न्यू.	अ.	न्यू.	अ.	न्यू.	अ.	न्यू.	अ.	न्यू.	अ.
20.0	20.30	—	—	—	—	—	—	—	—	2.30	2.80	2.80	3.30
25.00	25.30	—	—	—	—	—	—	2.30	2.80	2.80	3.30	3.50	4.10
32.00	32.30	—	—	—	—	—	—	3.00	3.50	3.60	4.20	4.50	5.20
40.00	40.40	—	—	—	—	2.30	2.80	3.70	4.30	4.50	5.20	5.60	6.40
50.00	50.50	—	—	2.30	2.80	2.90	3.40	4.60	5.30	5.60	6.40	6.90	7.80
63.00	63.60	—	—	2.50	3.00	3.60	4.20	5.80	6.60	7.00	7.90	8.70	9.80
75.00	75.70	—	—	2.90	3.40	4.30	5.00	6.90	7.80	8.40	9.50	10.40	11.70
90.00	90.90	2.30	2.80	3.50	4.10	5.10	5.90	8.20	9.30	10.00	11.20	12.50	14.00
110.00	111.00	2.70	3.20	4.30	5.00	6.30	7.20	10.00	11.20	12.30	13.80	15.20	17.00
125.00	126.20	3.10	3.70	4.90	5.60	7.10	8.10	11.40	12.80	13.90	15.50	17.30	19.30
140.00	141.30	3.50	4.10	5.40	6.20	8.00	9.00	12.80	14.30	15.60	17.40	19.40	21.60
160.00	161.50	4.00	4.60	6.20	7.10	9.10	10.30	14.60	16.30	17.80	19.80	22.10	24.60
180.00	181.70	4.40	5.10	7.00	7.90	10.20	11.50	16.40	18.30	20.00	22.20	24.90	27.60
200.00	201.80	4.90	5.60	7.70	8.70	11.40	12.80	18.20	20.30	22.30	24.80	27.60	30.60
225.00	227.00	5.50	6.30	8.70	9.80	12.80	14.30	20.50	22.80	25.00	27.70	31.10	34.50
250.00	252.30	6.10	7.00	9.70	10.90	14.20	15.90	22.80	25.30	27.80	30.80	34.50	38.20
280.00	282.60	6.90	7.80	10.80	12.10	15.90	17.70	25.50	28.30	31.20	34.60	38.70	42.80
315.00	317.90	7.70	8.70	12.20	13.70	17.90	19.90	28.70	31.80	35.00	38.70	43.50	48.10
355.00	358.20	8.70	9.80	13.70	15.30	20.10	22.40	32.30	35.80	39.50	43.70	49.00	54.10
400.00	403.60	9.80	11.50	15.40	18.00	22.70	26.40	36.40	42.10	44.50	51.40	55.20	63.70
450.00	454.10	11.00	12.90	17.40	20.30	25.50	29.60	41.00	47.40	50.00	57.70	—	—
500.00	504.50	12.20	14.30	19.30	22.40	28.40	32.90	45.50	52.60	55.60	64.20	—	—
560.00	565.00	13.70	16.00	21.60	25.10	31.70	36.70	51.00	58.90	—	—	—	—
630.00	635.70	15.40	18.00	24.30	28.20	35.70	41.30	57.30	66.10	—	—	—	—
710.00	716.40	17.40	20.30	27.40	31.80	40.20	46.50	—	—	—	—	—	—
800.00	807.20	19.60	22.80	30.80	35.70	45.30	52.30	—	—	—	—	—	—
900.00	908.10	22.00	25.50	34.70	40.20	51.00	58.90	—	—	—	—	—	—
1000.00	1009.00	24.40	28.30	38.50	44.50	56.70	65.50	—	—	—	—	—	—

नोट १ : न्यू = न्यूनतम, अ = अधिकतम

तालिका संख्या -१ (ग)

कच्चा पदार्थ पिाई-१०० को लागी।

पाईपको व्यास मि.मि.मा		पाईपको घेराको मोटाई (मि.मि.मा)							
		पि.एन ६		पि.एन .१०		पि.एन.१२.५		पि.एन .१६	
न्यू.	अ.	न्यू.	अ.	न्यू.	अ.	न्यू.	अ.	न्यू.	अ.
20.00	20.30	—	—	—	—	—	—	2.30	2.80
25.00	25.30	—	—	—	—	2.30	2.80	2.90	3.40
32.00	32.30	—	—	2.40	2.90	2.90	3.40	3.70	4.30
40.00	40.40	—	—	3.00	3.50	3.70	4.30	4.60	5.30
50.00	50.50	2.30	2.80	3.70	4.30	4.60	5.30	5.70	6.50
63.00	63.60	2.90	3.40	4.70	5.40	5.70	6.50	7.10	8.10
75.00	75.70	3.50	4.10	5.60	6.40	6.80	7.70	8.50	9.60
90.00	90.90	4.10	4.80	6.70	7.60	8.20	9.30	10.20	11.50
110.00	111.00	5.00	5.70	8.10	9.20	10.00	11.20	12.40	13.90
125.00	126.20	5.70	6.50	9.20	10.40	11.30	12.70	14.10	15.80
140.00	141.30	6.40	7.30	10.30	11.60	12.70	14.20	15.80	17.60
160.00	161.50	7.30	8.30	11.80	13.20	14.50	16.20	18.10	20.20
180.00	181.70	8.20	9.30	13.30	14.90	16.30	18.20	20.30	22.60
200.00	201.80	9.10	10.30	14.80	16.50	18.10	20.20	22.60	25.10
225.00	227.00	10.30	11.60	16.60	18.50	20.40	22.70	25.40	28.20
250.00	252.30	11.40	12.80	18.40	20.50	22.60	25.10	28.20	31.30
280.00	282.60	12.80	14.30	20.60	22.90	25.30	28.10	31.60	35.00
315.00	317.90	14.40	16.10	23.20	25.80	28.50	31.60	35.50	39.30
355.00	358.20	16.20	18.10	26.20	29.10	32.10	35.60	40.00	44.20
400.00	403.60	18.20	21.20	29.50	34.20	36.20	41.90	45.1	52.10
450.00	454.10	20.50	23.80	33.10	38.30	40.70	47.10	50.8	58.70
500.00	504.50	22.80	26.50	36.80	42.60	45.20	52.20	56.4	65.10
560.00	565.00	25.50	29.60	41.20	47.60	50.60	58.40	—	—
630.00	635.70	28.70	33.30	46.40	53.60	56.90	65.70	—	—
710.00	716.40	32.30	37.40	52.30	60.40	—	—	—	—
800.00	807.20	36.40	42.10	58.90	68.00	—	—	—	—
900.00	908.10	41.00	47.40	—	—	—	—	—	—
1000.00	1009.00	45.50	52.60	—	—	—	—	—	—

नोट १ : न्यू = न्यूनतम, अ = अधिकतम

परिशिष्ट (क)

इन्टरनल प्रेशर क्रीप रप्चर टेष्ट (Internal Pressure creep rupture test)

क.१ पाइप उत्पादन भएको २४ घण्टा नभईकन यसको परीक्षण गर्नु हुँदैन ।

क.२ परीक्षणको लागि नमुना पाईप (Test Specimen) :

क. २.१ बाहिरी व्यासको १० गुणा लम्बाई भएको नमुना पाईपको टुक्रा परीक्षण गर्नु पर्ने हरेक पाइपबाट परीक्षणको लागि लिइनु पर्नेछ । तर नमुना पाइपको लम्बाई २५० मिमि भन्दा कम र ७५० मिमि भन्दा बढी हुनु हुँदैन ।

क.३ उपकरण (Apparaturs)

क.३.१ ताप नियन्त्रण गर्न मिल्ने पानी सहित ट्याँकी (Water Bath) मा परीक्षण गर्नु पर्ने नमुना पाईपको टुक्रा डुबाउँदा नियन्त्रीत भित्रि हाईड्रोलिक चाप (Controlled Internal Hydraulic Pressure) दिन मिल्ने उपकरण

क.४ प्रक्रिया (Procedure)

क.४.१ पाईपको दुवै मुख सिलिङ्ग प्लग (Sealing Plug) ले यसरी बन्द गरिएको हुनु पर्नेछ । ताकि आन्तरिक चाप (Internal Pressure) बाट उत्पन्न भएको बल (Axial Force) पाईपमा जावोस र लम्बाई तिर बढ्नमा पाइपलाई कुनै बाधा नपरेको हुनु पर्नेछ ।

क.४.२ बन्द गरिएको एउटा प्लग खुलेर कोठाको तापक्रममा पाइपमा पानीले भर्नु र एक घण्टा सम्म तलिका नं। २ अनुसारको परीक्षण तापक्रममा सो पाइपलाई पानी ट्याँकी (Water Bath) मा डुबाउनु । तापक्रमको घटवढको सिमा $\pm 1^{\circ}$ सेग्रे। हुनेछ ।
पानी ट्याँकी (Water Bath) मा

क.४.३ यसरी परीक्षण तापक्रम रहेको पाइप भित्र परीक्षण चाप (Test pressure) नपुगेसम्म चाप विस्तारै वढाउँदै लैजाने । परीक्षण चापको घटवढको सिमा $\pm$२।५ प्रतिशत सम्म हुन सकिन्छ । यस परीक्षण चाप पाइपमा तालिका नं। २ अनुसार को परीक्षण अवधि सम्म रही रहनु पर्नेछ । यस परीक्षण चाप निम्न सूत्र (Formula) प्रयोग गरी निकालेको (Calculate) हुनु पर्नेछ ।

$$p = \frac{2.S6}{d-s}$$

जहाँ p = परीक्षण (Test Pressure) मेगापा।

6 = इन्डूस्ड स्ट्रेस (Induced Stress) मेगापा।

S = न्यूनतम घेराको मोटाई (Min. wall thickness) मिमि।

d = पाईपको बाहिरी व्यास (Outside dia meter) मिमि।

क.५ परीक्षणको लेखाजोखा (Assessment of Results)

क.५.१ परीक्षण अवधि भित्र पाइप कुर्न पनि किसिमले फुट्ने हुनु हुँदैन । पाईपको छेउ देखि "d" दूरी भित्र बढी पाईप फुट्छ भने सो परीक्षणलाई रद्द गरि अर्को परीक्षण गर्नु पर्नेछ ।

परिशिष्ट (ख)

(ख) रिभर्सन टेष्ट (Reversion Test)

ख.१ परीक्षणको लागि नमुना पाईप (Test Specimens) रिभर्सन टेष्टको लागि लिइने पाइपको लम्वाई २०० मि.मि. हुनु पर्नेछ।

ख.२ उपकरणहरू (Apparatus)

एयर ओभर (Air Oven) अथवा ११० ± ३ डिग्री सेन्टीग्रेड सम्म तापक्रम दिने उपयुक्त किसिमको कुनै तरल पदार्थ भएको ट्याँकी (Liquid Bath)

ख.३ प्रक्रिया (Procedure)

परीक्षणको लागि लिइएको २०० मि.मि. लम्वाईको पाइपको टुक्रालाई होरिजेन्टली (Horizontally) हूने गरेर ११० ± ३ डिग्री तापक्रममा दफा ख।२ मा उल्लेख भए अनुसारको एयर ओभन अथवा लिक्विड वाथ (Liquid Bath) भित्र ३० मिनेट सम्म राख्ने। त्यसपछि सो पाईपलाई कोठाको तापक्रममा चिस्याउनु र सो पाईपको लम्वाई फेरि नाप्नु। लम्वाईको अन्तर हिसाब गरेर प्रतिशत निकाल्नु।

$$\Delta l \,.\, \frac{lo\text{-}la}{l_0} \times 100$$

जहाँ

Δ_l . लम्वाईको अन्तर प्रतिशतमा

lo . पूर्व लम्वाई (Initial Length) मि.मि.

la . परीक्षणलाई लम्वाई (Lenghth after Test) मि.मि.

Annex –A

तौल सम्बन्धि जानकारी

Weight per meter in gm =π (D min - t min)x t min x ρ min

Where D= MinimumOuter diameter in mm

t= Minimum Wall thickness in mm given in table 1 (क), 2(ख), 3(ग)

ρ = Minimum density (i. e . 0.94 gm/cm^3)

Example

For **PE 63 , PN-6**

D min Minimum ourt diametet 63 mm
t min Minimum ourt wall thickness 7.7 mm
ρ density of the material 0.94 gm/cm^3)

Therfore ; For **PE 63 , PN-6**

Weight per meter in gm = 1257.942

For **PE 80 , PN-6**

D min Minimum ourt diametet 63 mm
t min Minimum ourt wall thickness 3.6 mm
ρ density of the material 0.94 gm/cm^3)

Therfore;

for PE 80 , PN-6
Weight per meter in gm = 631.73

For **PE 100 , PN-6**

D min Minimum ourt diametet 63 mm
t min Minimum ourt wall thickness 2.9 mm
ρ density of the material 0.94 gm/cm^3)

Therfore ; For PE 100 , PN-6
Weight per meter in gm = 514.893

नेपाल गुणस्तर तथा नापतौल विभाग राष्ट्रिय गुणस्तर निर्धारण गर्ने विभाग हो ।

नेपाल सरकारले यस विभागलाई निम्न जिम्मेवारीहरु सुम्पेको छ :–

- नेपाल गुणस्तर कायम गर्नु, संशोधन गर्नु वा रद्द गर्नु ।
- नेपाल गुणस्तर कार्यान्वयन गर्नु ।
- गुणस्तर प्रमाण चिन्ह प्रयोग गर्न इजाजत दिने वा प्रमाण पत्र दिने प्रयोजनको निमित्त सरकारी वा गैर सरकारी प्रयोगशालाहरुलाई मान्यता दिनु वा दिइएको मान्यतालाई निलम्बन वा रद्द गर्नु ।
- गुणस्तर प्रयोग गर्न इजाजत वा प्रमाणपत्र दिनु ।
- परीक्षण उपकरणहरुको मापांकन गर्नु तथा कानूनी नापतौल कार्यान्वयन गराउनु ।

नेपाल गुणस्तर तथा नापतौल विभाग
बालाजु, काठमाण्डौ, नेपाल
फोन नं। ४३५०८१८, ४३५०३६११४१, ४३५०४४५, ४३५०३५६६११
पोष्ट बक्स नं। ९८५
फ्याक्स नं। ०९७७–१–४३५०६८९
Email: nbsm@nbsm.gov.np
केबुल गुनिस

सर्वाधिकार सुरक्षित

SPECIFICATIONS

HDP Fittings

All HDP fittings shall be manufactured by Injection Moulding Process in accordance with IS:8008 (Part I-VII)-1976 or equivalent to join HDP pipes to IS:4984-1978 or equivalent. All fittings shall be moulded from a compound consisting of virgin polyethylene in which carbon black and suitable non-toxic anti-oxidant are evenly dispersed and shall be suitable for butt-welding at fusion temperature 200°-220°C. All HDP fittings shall conform corresponding to working pressure rating of 10kg/cm2 fittings supplied must have a clear marking indicating the relevant pipe size(s) indelibly on each item.

VALVES

GENERAL-All valves shall be manufactured to an internationally recognized standard and full details concerning such standards shall be provided by the manufacturer for approval before manufacture commences.Where British or Indian Standards are quoted in this specification an equivalent internationally recognized standard is acceptable. Cast iron shall have properties not inferior to those specified for Grade 14 of BS 1452 or equivalent and shall withstand the test pressure specified. All castings shall be carefully cleaned and dressed off.No stopping or plugging will be permitted in the case of holes or flaws appearing therein,and casting shall be made from first running. Gunmetal and bronze shall be of such compositions as have been proved in actual service to be the most suitable for the particular purpose. If any casting, forging, bearing or other part should prove to be defective, the Engineer shall have the power to reject it and the Supplier shall replace it atno extra expense to the Engineer.

INTERCHANGEABLE COMPONENTS

All similar equipment shall be strictly interchangeable as a whole and as regards their component parts.

PROTECTION AGAINST CLIMATIC CONDITIONS

Valves supplied shall be of the appropriate grade and quality for and shall be adequately protected against the tropical climatic conditions. The supplier shall take those conditions into account in deciding what grade,quality and protection is required.Cast iron and steel surfaces of all valves, hydrants, and fittings shall be painted with at least two coats of approved bituminous paint. Failure to comply with the requirements of the above will result inrejection by the Engineer.Valve bodies, protecting tubes, surface boxes and all other casting shall be coated in accordance with BS 5163 or equivalent, for tropical conditions. Where this is not applicable, they shall be thoroughly cleaned and given one coat of bituminous paint. Machined surfaces shall be covered by a suitable rust inhibitor, such as a high melting point grease of approved quality.All submerged moving parts of the valves, or the pins and spindles etc of submerged moving parts, or faces etc in contact with them shall be of non –corrodible materials. Any parts that show signs of corrosion or wear during the Period of Liability shall be replaced by non – corrodible material of special quality for the purpose at no extra expense to the Engineer. Care shall be exercised in the choice of metals for use in the valves to reduce the effects of bi-metallic corrosion to a minimum. The foregoing shall apply also to the moving parts of valves exposed to the weather.

WORKS TESTS

All valves shall be hydrostatically tested at the place of manufacture to the pressures specified and valves shall satisfactorily pass the specified tests before they are packed
For delivery. All valves shall be body tested to twice the working pressurestated in the Bill Of Quantities. Seat tests to the working pressure stated in the Bill of Quantities shall be carried out on all sluice valves and stop valves. All sluice valves and stop valves shall be subjected to "open end" test in accordance with BS 1218 or equivalent and each valve shall be subjected to three separate hydrostatic tests as follows:

(a)Seat Tests

(i) The tightness of seats shall be tested as follows:with the wedge closed and with the valve fixed at one end only the test pressure shall be applied to one face of the wedge,The other face being at atmospheric pressure. There shall be no visible leakage past the wedge at the hydrostatic test pressure (gauge) specified;

(ii) The above procedure shall be repeated but with the valve fixed at the other end and with the pressure applied to that end of the valve. (b) Body Test With the wedge open the test pressure (gauge) specified shall be applied to the whole body of the valve. There shall be no visible leakage. The test durations for all tests shall be as in the table below:

NOMINAL DIAMETER MM	MINIMUM TEST DURATION (MINUTES) FOR	
	BODY	SEAT (IF APPLICABLE)
50 and under 65 to 150 200 to 300	0.25 1 2	0.25 1 2

All valves shall be marked with east –on or stamped lettering stating the body test pressure in meters head of water. The cost of testing shall be included in the contract rates.

VALVES GENERALLY

Valves shall have adequate provision for lubrication, shall cause the minimum of head loss In the open position and shall seal the water passage completely when shut. All valves shall be closed in a clockwise direction unless otherwise specified. Direction of closing to be shown on the hand wheel. All valves shall be suitable for use with water in the temperature range - 10°C to 70°C and for working pressure of 10 bar or as otherwise specified. Each flanged valve shall be supplied complete with nuts, bolts, washers, and Joint rings. Joint rings shall be of that section complying with BS 4190 or equivalent and shall not extend beyond the inner edges of the bolt holes.Bolts and nuts shall be hexagonal complying with BS 4190 or equivalent. All materials which may come in contact With raw or potable water shall be free from toxic substances and shall not foster microbiological growth or give rise to taste, cloudiness or discolouration of the water with which they are or could be in contact. Rubber used in valves shall be ethylene propylene rubber (EPDM or EPM) or styrene butadiene rubber (SBR), which complies with the above requirements, and is suitable for making a long term flexible seal and is resistant to mechanical, chemical, or bacteriological attack leading to deterioration of the flexible seal

AIR VALVES

Single orifice air valves shall be of cast iron body, reliable in action and shall operate in such a manner that the balls of the valves cannot be held against the orifice by air pressure alone. Each air valve shall be Supplied with an approved isolating device. The inlet shall be male screwed 15 mm diameter suitable for connection to a GMS riser pipe. Max I mum operating pressure will be 1 00 meters head of water

MARKING AND PACKING

Each valve shall be indelibly marked with the diameter, weight and pressure rating and shall in addition carry a unique reference number to enable each item to be clearly identified to works fabrication records, works test certificates, delivery notes and the like. All valves shall bear the authorized Standard mark cast on showing to which Standard specification they have been manufactured. Whenever possible the identification marks except for the "Standard mark" shall be painted on the outside of the item but where there is insufficient smooth surface area to accommodate the identification marks they shall be put on rust proofed metal tags secured to the item with galvanized wire.Flanges shall be protected with wooden discs attached by service bolts or other approved means. Service bolts shall not be incorporate ed in the works. All items shall be properly prepared and packed for delivery and shipping. In particular, small items such as small valves, parts of operating gear, bolts, nuts, gaskets, and other joint components shall be crated for delivery.Each crate shall contain a detailed packing list in a waterproof envelope. The outside of the crate shall bear a general description of the contents and identification mark relating it to the detailed packing list. All valves and fittings shall be securely packed in crates or boxes for protection against damage during transit.The costs of packing shall be included in the contract rates. None of the packing will be returnable.

Gl Valve Key

The Valve Box Keys shall be manufactured according to sample or drawing made available to the manufacturer. Valve Boxes Keys to be manufactured of light duty pipe conforming to Nepal Standard NS:199 -2046 or Indian Standard IS: 1239 (Part I) – 1990 or equivalent.Other required reducers shall conform to IS: 1879 – 1987 or equivalent.

Cl Manhole Cover and Frame

Cl Manhole cover and frame shall be manufactured as per drawing or samples made available to the manufacturer conforming to NS: 104 o 2042 or IS: 1726 of latest Edition or equivalent. Cl manhole covers and frames are to be Provided and fixed on the top RCC slab as per drawing with minimum 100mm thick M150 RCC. The Cl manhole cover shall be laid as such so that top of the manhole cover should be the same of the top of the road surface or finished level of Manhole shall match with the finished level of surrounding structure. The Cl manhole cover shall be measured In numbers unless otherwise mentioned in the BoQ The rate shall include cost of material,transportation, laying , fixing and other necessary associated parts including necessaryform works, PCC, reinforcement, curing, etcasinstructed by the Engineer

Any materials uncovered in above specifications will be as per the instruction of Site Engineer.

1. HDPE Pipes

These specifications are for pipes diameter up to 630 mm.

Providing and supplying in standard length High Density Polyethylene (HDPE) pipes suitable for potable water as per IS specification 4984/1995 or equivalent standards.

The item shall be covering manufacturing, supplying and delivery of HDPE pipes having material grade PE100 bearing IS4984/1995 or equivalent standards and its latest version or amendments. The HDPE pipes shall be supplied in standard length or as specified herein. However, at least all the requirements mentioned herein as per 4984/1995 shall be fulfilled if the supplied pipes are manufactured according to other than Indian Code of Standard.

1.1 Grade of Material

Raw material used to manufacture the HDPE pipes shall be virgin compounded or Natural black PE 80 resin confirming to IS4984:1995, IS7328:1992 and ISO4427:1996. The resin proposed to be used for manufacturing of the pipes should also comply with the following norms as per ISO 9080:1992:

a) The resin should have been certified by an independent laboratory of international repute for having passed 10,000 hour long term hydrostatic strength (LTHS) test extrapolated to 50 years to show that the resin has a minimum MRS of over 10MPa. Internal certificate of any resin manufacturer will not be acceptable.

b) Certificate for having passed the full scale rapid crack propagation test as per ISO 13478. (iii) The resin grade for PE 100 shall be 46GP003.

1.2 Pressure Rating

The pressure rating of HDPE pipes and specials shall be of PN 6 confirming to clause 3.3 of IS 4984.

1.3 Color of pipes

The Color of the HDPE pipe shall be confirming to clause 4 of IS4984:1995 or clause 3.1.2, 3.1.3 and 3.2 of ISO4427:1996.

1.4 Dimensions

The pipes up to diameters 63mm shall be supplied in coils of 100m length. The coils shall be as per the provisions of clause 6.5 of IS4984:1995. Pipe beyond 63mm shall be supplied in straight lengths of minimum 6m to 12m as per Engineers instructions.

The internal diameter, wall thickness, length and other dimensions of pipes shall be as per relevant tables of IS: 4984 for different class of pipes. Each pipe shall be of uniform thickness throughout its length. The wall thickness of the PE80, PN 6 pipes shall be as per the table given below:

Nominal Dia of HDPE Pipe (mm)	Wall Thickness (mm)	
	Minimum	Maximum
63	2.9	3.4

75	3.5	4.1
110	5.0	5.7
160	7.3	8.3
200	9.1	10.3
315	14.4	16.1
400	18.2	21.2

The dimension tolerances shall be as per IS: 4984.

1.5 Performance requirements

The pipe supplied should have passed the acceptance tests as per clause 9.2 of IS4984:1995. The manufacturer should provide the test certificates for the tests conducted, as required in clause 9.2 of IS4984:1995 along with the supply of pipes. These tests can be performed in the in-house laboratory of the pipe manufacturer or at an approved laboratory.

1.6 Marking

As per the provisions of clause 10 of IS4984:1995, each straight length of the pipe shall be clearly marked in inedible ink/ paint on either end and for coils at every 5m the following information:

a) The manufacturer's name and/ trade mark

b) Designation of the pipe as per IS or equivalent code iii. Lot number/ Batch number

1.7 Fittings / Specials

All HDPE fittings/ specials shall be molded for lower diameter up to 200mm dia and fabricated for other diameter in accordance with IS: 8360 (Part I & III). PE Injection molded fittings shall be as per IS: 8008 (Part I to IX). All fittings/specials shall be fabricated or injection molded at factory only. No fabrication or molding will be allowed at site, unless specifically permitted by the Engineer.

Fittings will be Butt welded on to the pipes.

The Supplier shall submit to the Engineer a detailed installation guideline/procedure, in accordance with the fitting manufacturer's recommendations. This should include safety procedures, tools/equipment required, staff requirements including list of names of qualified electrofusion operators, pre-installation requirements, installation steps, fault rectification, inspection and process documentation as discussed above.

1.8 Jointing

All pipelines shall be jointed in accordance with the manufacturer's instructions and to the approval of the Engineer.

Until required for incorporation in a joint, each rubber ring or gasket shall be stored in the dark, free from the deleterious effects of heat or cold, and kept flat so as to prevent any part of the rubber being in tension.

All pipes with flexible joints shall be accurately marked prior to laying to ensure that the correct gap is left in the joint.

In the jointing of pipes with flanges, special care shall be taken to align, grade, and level the pipes, specials, and valves to avoid straining of the flanges. All bitumen and paint shall be removed from the mating face of each flange immediately before jointing. Bolts shall be tightened up evenly in opposite pairs to ensure uniform bearing, the final tightening shall be to the torque specified by the manufacturer.

Care shall be taken to avoid damage to the internal surface of the pipes during assembly of the pipeline.

Once joints are made they shall be protected to a level appropriate for the pipe by: polyethylene sleeving, muffs, or with molding putty and tape wrapping.

Pipes shall be laid to the lines and grades given in the plans, with the ends abutting to form an even joint without shoulders or unevenness of any kind along the invert of the pipes. No joint shall be made under water. The ends of the pipes shall be dry and kept clean before and during laying and jointing operations.

All joint work shall be done in an approved manner by skilled workmen so that the completed pipeline shall have a continuous, smooth and uniform interior surface. Extruded joint material shall be removed from the interior of the pipe. In cold weather, protective measures must be taken to ensure a satisfactory joint.

Jointing for pipes and fittings / specials shall be done in accordance with the relevant Specifications depending on type of pipes being used.

1.9 Cutting of Pipes

Pipes shall be cut by a method which provides a clean square cut of the pipe and of the lining, without damage to pipe or lining. All cut or trimmed ends and the parts of any pipe on which the coating may have suffered damage shall be re- coated as specified before the pipes are laid.

The external area at cut spigot ends of ductile iron pipes shall be ground smooth for a distance of at least 125 mm, and then chamfered or otherwise made suitable for jointing as recommended by the pipe manufacturer.

2.0 Construction and Workmanship for HDPE Pipes

2.1 Preparation of Pipes

HDPE pipes shall be joined to form a string above ground prior to snaking into the trench. To prevent scoring, pipe rollers should be used.

Before lowering HDPE pipelines into the trench, a check should be made for cuts, deep scratches or other pipe damages and in fusion jointed systems that the system has cooled sufficient before stress is imposed upon any pre- made joints.

When lowering pipe into the trench, care should again be taken to avoid scoring of the pipe by contact with the sides and bottom of the trench. Use should be made of planks and ropes where appropriate but wire ropes or chains should not be used.

2.2 Laying of Pipes

Gradual changes in direction of HDPE pipelines can be accommodated by pipe deflection but every effort should be made to keep the pipe at the center as possible within the trench to enable adequate compaction of side-fill.

HDPE pipes and fitting may be partially or completely surrounded by concrete but they should be protected by 3mm rubber membrane to avoid possible damage during pouring or compaction to prevent high localized stresses.

After completion of an installation, pipe work and fittings should be inspected and made ready for testing to ensure the safety and efficiency of the systems. The trench may be backfilled prior to testing; but it is advisable to leave at least the joints exposed throughout the test.

Complete and accurate records should be taken of the installation. It is useful for records to be taken before the pipes are buried.

2.3 Connection to HDPE Pipe

2.3.1 Jointing

Pipe joining for pipes buried underground, below pavement or slab or concealed in slab shall use Butt Welded jointing (Saddle Jointing). Unless instructed otherwise by the Engineer or mentioned in BOQ jointing of HDPE pipes and fittings shall be done by fully automatic butt fusion jointing.

2.3.2 Butt Fusion

Electrical heated plate shall be used in the process of welding HDPE pipes and fittings in butt fusion jointing. Only pipes and fittings of the same material type, size and rating shall be butt welded, e.g. PE 100 pipes should not currently be welded to PE 80 pipes. PN 10 pipe should not be welded to PN 6 pipe or fitting. Jointing between HDPE pipes and specials shall be done as per the latest IS: 7634 part II or equivalent code.

Wherever necessary the Contractor shall use automatic or semi-automatic, hydraulically operated, superior quality electro fusion machines which will ensure good quality electrofusion welding of HDPE pipes.

2.3.3 Pressure and Leakage Test

All newly installed pipelines and old pipes for connection to the new system must undergo sectional pressure and leakage testing prior to final acceptance. This memorandum provides recommended standards for pressure and leakage testing HDPE water lines. Simultaneous or separate pressure and leakage tests should be performed. The test duration and pressures for each option are specified in table below. If separate tests are made, the pressure test should be conducted prior to the leakage test.

Pressure and Leakage Test Methods

Procedure	**Test Pressure**	**Duration of Test**
Simultaneous Pressure & Leakage Test	150% of working pressure* at the point of test, but not less than 125% of normal working pressure at the highest elevation	2 Hours
Separate Pressure test	150% of working pressure* at the point of test not less than 125% of normal working pressure at highest elevation	1 Hour
Separate Leakage Test	150% of working pressure* of segment tested	2 Hours

Note: working pressure is defined as the maximum anticipated sustained operating pressure. However, in no case shall the test pressure exceed the pressure rating for the pipe, valves, appurtenances, or thrust-restraints.

The purpose of the pressure test is to locate defects in materials or workmanship. Before testing, the pipeline must be backfilled and braced sufficiently to prevent movement under pressure.

A pressure test should be conducted at 150% of the working pressure in the line. The working pressure is defined as the maximum anticipated sustained operating pressure in the line being tested. Care must be taken not to exceed the pressure rating of pipes, valves, fittings, thrust restraints, or other appurtenances. Pressures in the main may exceed the specified test pressure if the water pressure is read from a gauge located at a high point in the main.

ने.गुण. ५९६ : २०७९

NS 596: 2079

नेपाल गुणस्तर

NEPAL STANDARD

Oriented Unplasticized Polyvinyl Chloride (PVC-O) Pipes for Water Supply - Specification

Government of Nepal

Ministry of Industry, Commerce and Supplies

Nepal Bureau of Standards and Metrology (NBSM)

Kathmandu, Nepal

www.nbsm.gov.np

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Table of Contents

Forward III

1. Scope.....1

2. References.....1

3. Terminology.....1

4. Symbol and abbreviated terms.....3

5. Material 4

6. Classification of pipes.....5

7. General requirements of pipes.....6

8. Geometrical characteristics of pipes.....6

9. Mechanical characteristics of pipes Geometrical characteristics of pipe.....15

10. Physical and Chemical Characteristics.....15

11. Mechanical Characteristics of Assemblies Including Joints.....16

12. Elastomeric seals.....19

13. Sampling And Criteria For Conformity.....19

14. Marking 19

Annex A.....21

Annex B.....22

Annex C.....23

Annex D.....25

Annex E.....26

Annex F.....27

Annex G.....28

Annex H.....35

Foreword

NBSM (Nepal Bureau of Standards and Metrology) is the National Standard Body involved in the development of standards in the country. The standard development process involves committee consisting of multi-stakeholders both from public and private sectors.

This standard is developed by technical committee having multi-stakeholder participation and approved by Nepal Standard Council as per Nepal Standard (Certification) Act, 1980.

This standard pertains to Oriented Unplasticized Polyvinyl Chloride (PVC-O) Pipes for Water Supply - Specification, for water supply use. This standard is based on ISO16422:2014 – Pipes and joints made of oriented unplasticized poly (vinyl chloride) (PVC – O) for the conveyance of water under pressure – Specification and IS 16647:2017 – Oriented Unplasticized Polyvinyl Chloride (PVC –O) Pipes for water supply – Specification.

This standard will benefit both the users and the producers to have product of appropriate design and dimension; and will provide assurance of quality of the products and variety of product for water supply as well. The standard covers materials, design and dimension, tests, and sampling requirements.

This standard contributes towards fulfilment of SDG goals.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. NBSM shall not be held responsible for identifying any or all such patent rights. Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.nbsm.gov.np.

Oriented Unplasticized Polyvinyl Chloride (PVC-O) Pipes for Water Supply - Specification

1 SCOPE

1.1 This standard specifies the requirements of Oriented Unplasticized Polyvinyl Chloride (PVC-O) Pipes, for piping systems intended to be used underground, or above ground but not exposed to direct sunlight, for water supply. This standard covers requirement for pipes of sizes 63 mm to 1200 mm with maximum required strength (MRS) class 450 and 500 and design coefficient of 1.4 and 1.6.

1.2 The piping system according to this standard is intended for the conveyance of cold water under pressure and are suitable for conveyance of water, including potable water, up to and including 45 °C and especially in those applications where special performance requirements are needed, such as impact loads and pressure fluctuations, up to pressure of 2.5 MPa.

1.3 Joints constructed of other materials should meet requirements of relevant standards in addition to the fitness-for-purpose requirements of this standard.

2 REFERENCES

The standards listed in Annex A contain provisions which, through reference in this text, constitute provision of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreement based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated in Annex A.

3 TERMINOLOGY

For the purpose of this standard, the following terms and definitions shall apply.

3.1 Nominal Outside Diameter (d_n) — Numerical designation of size which is common to all components in a thermoplastics piping system other than flanges and components designated by thread size.

3.2 Outside Diameter at Any Point (d_e) — Value of the measurement of the outside diameter through its cross-section at any point of a pipe or spigot, rounded up to the nearest 0.1 mm.

3.3 Mean Outside Diameter (d_{em}) — Value of the measurement of the outer circumference of a pipe or spigot end of a fitting in any cross-section, divided by a (- 3.142), rounded up to the nearest 0.1 mm.

3.4 Minimum Outside Diameter ($d_{em\ min}$) — The minimum value of the mean outside diameter as specified in this standard. The value is equal to the nominal outside diameter d and is expressed in mm.

3.5 Maximum Outside Diameter ($d_{em\ max}$) — The maximum value of the mean outside diameter as specified in this standard.

3.6 In side Diameter at any Point of a Pipe Socket (d_i) — Value of the measurement of the inside diameter through its cross-section at any point of a pipe socket, rounded up to the nearest 0.1 mm.

3.7 Nominal Wall Thickness (e_n) — Specified wall thickness, in mm.

Note: It is identical to the specified minimum wall thickness at any point $e_{y\ min}$.

3.8 Out of Roundness (Ovality) — The difference between the measured maximum and the measured minimum outside diameter in the same cross-section of the pipe or spigot.

3.9 Tolerance —Permitted variation of the specified value of a quantity expressed as the difference between the permitted maximum and the permitted minimum value.

3.10 Nominal Pressure (PN) — Alphanumeric designation related to the mechanical characteristics of the components of a piping system and used for *re*ference purposes.

3.11 Hydrostatic Pressure (p) — Internal pressure applied to a piping system.

3.12 Working Pressure — Maximum pressure which a piping system can sustain in continuous use under given service conditions without pressure surge.

NOTE— For thermoplastics piping systems, the value of the nominal pressure is equal to the working pressure at a temperature of 27°C, expressed in kg/cm^2.

3.13 Hydrostatic Stress (σ) — Stress, expressed in MPa, induced in the wall of a pipe when it is subjected to internal water pressure.

NOTE: It is calculated using the following approximate equation.

$$\sigma = \frac{P\,(d_n - e_n)}{2e_n}$$

where

p — applied internal pressure, in MPa;

d_n — nominal outside diameter of the pipe, in mm; and

e_n = nominal wall thickness, in mm.

3.14 Long-Term Hydrostatic Strength for 50 Years at 20°C (σ_{LTHS}) — Quantity with the unit of stress in MPa, which can be considered to be a property of the material under consideration.

NOTE— It represents the 97.5 percent lower confidence limit for the Long-term hydrostatic strength and equals the predicted average strength at a temperature of 20°C and for a time of 50 years with internal water pressure.

3.15 Lower Confidence Limit of the Predicted Hydrostatic Strength (σ_{LpL}) — Quantity with the dimension of stress, which represents the 97.5 percent lower confidence limit of the predicted hydrostatic strength for a single value at a temperature T and a time t.

NOTES:

1. It is denoted as $\sigma_{LPL} = \sigma(t,T, 0.975)$
2. The value of this quantity is determined by the method given in NS...(Applicable Nepal standard)

3.16 Minimum Required Strength (MRS) — Required value of σ_{lpl} for a temperature T of 20°C and a time t of 50 years.

3.17 Design Coefficient (C) — Coefficient with a value greater than one, which takes into consideration service conditions as well as properties of the components of a piping system other than those represented in σ_{lpl} •

3.18 Orientation Factor — Factor related to the stretch ratio used in orientation processing.

3.18.1 Axial Orientation Factor — Ratio between the length of the test piece before heat treatment and the *lowest measured length after the heat treatment (see 9.4):*

$$\lambda_a = \frac{L_0}{L_i}$$

3.18.2 Circumferential Orientation Factor — Ratio between the diameter of test piece before and after heat treatment (see 9.4):

$$\lambda_c = \frac{(D_{em} - e_{em})}{(D_i - e_i)}$$

The orientation ratio in tangential direction is the lowest measured value.

3.19 Type Tests — Tests carried out whenever a change is made in the composition or in the size/series in order to establish the suitability and the performance capability of the pipe.

3.20 Acceptance Tests — Tests carried out on samples taken from a lot for the purpose of acceptance of the lot.

3.21 Virgin Material — Material in such form as granules or powder that has not been subjected to use or processing other than that required for it's from the production of pipes, which will be reprocessed in a manufacturer's plant by a process such as extrusion and for which the complete formulation is known.

3.22 Own Rework Material — Material prepared from rejected unused pipes, including the trimmings from the production of pipes, which will be reprocessed in a manufacturer's plant by a process such as extrusion and for which the complete formulation is known.

3.23 Nominal Pipe Length (l) — Effective length of pipes excluding the depth of the socket.

4 SYMBOLS AND ABBREVIATED TERMS

4.1 Symbols

C	=	Overall service (design) coefficient
d_e	=	Outside diameter at any point
d_{em}	=	Mean outside diameter
d_i	=	Inside diameter at any point
d_{im}	=	Mean inside diameter of the socket
d_n	=	Nominal outside diameter
e	=	Wall thickness at any point
e_m	=	Mean wall thickness
e_n	=	Nominal wall thickness
l	=	Nominal pipe length
f_A	=	Derating or uprating factor for application
f_T	=	Derating factor for temperatures
K	=	K-value
p	=	Hydrostatic pressure
p_t	=	Test pressure
PN	=	Nominal pressure
θ	=	Material density
σ	=	Hydrostatic stress
σ_s	=	Design stress
λ_a	=	Axial orientation factor
λ_c	=	Circumferential orientation factor
σ_{LPL}	=	Lower predicted confidence limit

4.2 Abbreviations

DN — Nominal size
MRS — Minimum required strength
PFA — Allowable operating pressure
PVC0 --- Oriented Unplasticized polyvinyl chloride
PVCU --- Unplasticized Polyvinyl Chloride

5 MATERIAL

5.1 The material from which the pipe is produced shall consist substantially of unplasticized polyvinyl chloride to which may be added only those additives that are needed to facilitate the manufacture of the pipe and the production of sound and durable pipe of good surface finish, mechanical strength and opacity under conditions of use. None of these additives shall be used separately or together in quantities sufficient to constitute a toxic, organoleptic or microbial growth hazard, or materially to impair the fabrication or welding properties of the pipe, or to impair its chemical and physical or mechanical properties (in particular long term mechanical strength and impact strength) as defined in this standard. The additives to be used shall be selected from NS 555 and shall be uniformly dispersed.

5.2 Rework Material

The use of the manufacturer's own reprocessed material, produced during the manufacture and works testing of products and conforming to the material requirements of this standard, is permitted. Reprocessed or recycled material obtained from external sources shall not be used.

5.3 VCM Content

The monomer content (VCM content) in the resin shall be within the limits specified in **3.1** of NS XX.....:XXXXwhen tested as per NSXX.....:XXXX

5.4 K- Value

The composition shall be based on *PVC* resin having a K-value of 64 or greater, when tested in accordance with NS... (Appropriate and Applicable Nepal standard).

NOTE - A test report or conformity certificate may be obtained from the resin manufacturer for the VCM content (see 5.3) and K-value (see 5.4) of the resin being used, unless the same is tested in an independent laboratory. The frequency of this test report or conformity certificate shall be once in every three months.

5.5 Density

When determined in accordance with NS 558 , the density of the pipe shall be between 1.40 g/cc and 1.46 g/cc.

5.6 Material Classification

5.6.1 MRS Value

Oriented pipes made from a defined PVC-U compound and with a well-defined orientation level in circumferential and axial direction, shall be evaluated according to the procedures specified in NS... (Appropriate and Applicable Nepal standard) on the basis of tests given in 9.1.1 *(see also* 5.6.3**).** Based on the minimum required strength (MRS) values, the material shall be classified in accordance with Table 1.

Table 1 Material Classification, Design Coefficient and DesignStress

(Clause 5.6.1)

S.N.	Minimum Required Strength (MRS) Mpa	Pipe Material Classification Number	Design Coefficient, C	Design Stress, σ_s=MRS/C
i.	45	450	1.4	32
			1.6	28
ii.	50	500	1.4	36
			1.6	31

5.6.2 Design Coefficient

The design coefficient of PVC-O pipes shall be either 1.4 or 1 .6 as specified by the manufacturer (see Table 1).

5.6.3 Design Stress

The design stress shall be based on the value of the lower confidence limit σ_{LPL} of the long term hydrostatic strength for the resistance to internal pressure as determined in accordance with NS... (Appropriate and Applicable Nepal standard).

This σ_{LPL} value shall be converted into a minimum required strength (MRS) in accordance with NS... (Appropriate and Applicable Nepal standard. The MRS shall be divided by an overall service (design) coefficient, C to give the design stress σ_s which is expressed by the following equation:

$$\sigma_s = \frac{MRS}{C}$$

6 CLASSIFICATION OF PIPES

The pipes shall be classified by their pressure rating Nominal Pressure (PN), at 27 °C, and their material class classification and design coefficient, as per Table 2.

Table: 2 Pressure Rating and Working Pressure of Pipes

(Clause 6)

S.N.	Design Coefficient, C	Pressure Rating									
i.	*For Material Classification - Class 450*										
	a) 1.4	PN 10		PN 12.5	--	PN 16	--	PN 20	--	PN 25	--
	b) 1.6	--	PN 10	--	PN 12.5	--	PN 16	--	PN 20	--	PN 25
ii.	*For Material Classification - Class 500*										
	a) 1.4	--	PN 12.5	--	PN 16	--	PN 20	--	PN 25	--	--
	b) 1.6	PN 10	--	PN 12.5	--	PN 16	--	PN 20	--	PN 25	--

Working pressure corresponding to various pressure ratings:

Pressure Rating	Working pressure
PN 10	1.0 Mpa (10 kg/cm^2)
PN 12.5	1.25 Mpa (12.5 kg/cm^2)
PN 16	1.6 Mpa (16 kg/cm^2)
PN 20	2.0 Mpa (20 kg/cm^2)
PN 25	2.5 Mpa (25 kg/cm^2)

NOTE: The above pipes are recommended for water temperatures ranging from 1 °C to 45 °C. At temperatures higher than 27 °C and up to 45 °C, the strength of the pipe reduces and the working pressure shall therefore he modified using the debating factor as obtained from the graph given in Annex B. Occasional rise in temperature as in summer season with concurrent corresponding reduction in temperature during nights has no deleterious effect on the life/working pressure of the pipes considering the total life of pipes.

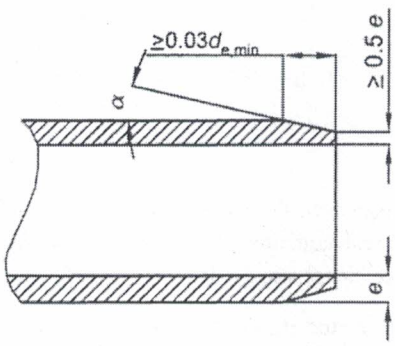


Fig:1 Spigot end of Pipe with Elastomeric Sealing Ring

7 GENERAL REQUIREMENTS OF PIPES

7.1 Visual Appearance

When checked without magnification glass, the internal and external surfaces of the pipe shall be smooth, clean, and free from scoring, cavities and other surface defects. Slight shallow longitudinal grooves or irregularities in the pipe shall be permissible provided the wall thickness remains within the permissible limits. The material shall not contain visible impurities. The ends of the pipe shall be either cut cleanly and reasonably square to the axis of the pipe or chamfered at the plain end at approximately 15° to the axis of the pipe (see 8.3 and Fig. 1).

7.2 Colour

The colour of the pipes shall be any shade of grey, blue or cream. The pipes may also be supplied in any other colour as agreed to between the manufacturer and the supplier. Slight variations in the appearance of the colour may be permitted.

7.3 Opacity

The wall of the pipe shall not transmit more than 0.2 percent of the visible light falling on it, when tested in accordance with NS 558.

8 GEOMETRICAL CHARACTERISTICS OF PIPES

8.1 Dimension of Pipes

8.1.1 Diameter

The nominal outside diameter, outside diameter at any point and their tolerances shall be as given in Table 3 and shall be measured according to the method given in NS 558.

8.1.1.1 Nominal outside diameter

The permissible variation $(d_{em} - d_n)$ between the mean outside diameter (d_{em}) and the nominal outside diameter (d_n) of a pipe shall be positive in the form +x, where x is less than or equal to the greater of the following two values:

a) 0.3 mm, and

b) $0.003d_n$ rounded off to the next higher 0.1 mm with maximum value of 2.0 mm.

8.1.1.2 Diameter at any point

The permissible variation between the outside diameter at any point (d_c) and the nominal diameter (d_n) of a pipe (also called tolerance on ovality) shall not exceed the greater of the following two values:

a) 0.5 mm, and

b) $0.012d_n$ rounded off to the next higher 0.1 mm.

Table 3 Outside Diameters and Tolerances
(Clause 8.1. 1)

S.N.	Nominal Outside Diameter, d_n, mm	Mean Outside Diameter, d_{em}, mm		Outside Diameter at any Point , d_e, mm	
		Min	Max	Min	Max
i	63	63	63.3	62.2	63.8
ii	75	75	75.3	74.1	75.9
iii	90	90	90.3	88.9	91.1
iv	110	110	110.4	108.6	111.4
v	125	125	125.4	123.5	126.5
vi	140	140	140.5	138.3	141.7
vii	160	160	160.5	158	162
viii	180	180	180.5	177.8	182.2
ix	200	200	200.6	197.6	202.4
x	225	225	225.7	222.3	227.7
xi	250	250	250.8	247	253
xii	280	280	280.9	276.6	283.4
xiii	315	315	316	311.2	318.8
xiv	355	355	356.1	350.7	359.3
xv	400	400	401.2	395.2	404.8
xvi	450	450	451.4	444.6	455.4
xvii	500	500	501.5	494	506
xviii	560	560	561.7	553.2	566.8
xix	630	630	631.9	622.4	637.6
xx	710	710	712	701.4	718.6
xxi	800	800	802	790.4	809.6
xxii	900	900	902	889.2	910.8
xxiii	1000	1000	1002	988	1012
xxiv	1200	1200	1202	1185.6	1214.4

Table 4 Wall Thicknesses (mm) for Material Class 450/C 1.4, {Clause 8.1.2}

SI No.	Nominal Diameter, d.	Class 450/C= 1.4 Wall Thickness, e.				
		Nominal Pressure, PN				
		10	12.5	16	20	25
(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)	63	1.1	1.3	1.7	2.1	2.6
ii)	75	1.3	1.6	2	2.4	3.1
iii)	90	1.5	1.9	2.4	2.9	3.7
iv)	110	1.8	2.3	2.9	3.6	4.5
v)	125	2.1	2.6	3.3	4.0	5.1

SI No.	Nominal Diameter, d.	Class 450/C= 1.4 Wall Thickness, e.				
		Nominal Pressure, PN				
		10	12.5	16	20	25
vi)	140	2.3	2.9	3.6	4.5	5.7
vii)	160	2.6	3.3	4.2	5.1	6.5
viii)	180	3	3.7	4.7	5.8	7.3
ix)	200	3.3	4.1	5.2	6.4	8.1
x)	226	3:01	4.6	5.8	'7.2	9.1
xi)	250	4.1	5.1	6.5	8	10.2
xii)	280	4.6	5.7	7.2	9	11.4
xiii)	315	5.1	6.4	8.1	10.1	12.8
xiv)	355	5.8	7.2	9.2	11.4	14.4
xv)	400	6.5	8.1	10.3	12.8	16.2
xvi)	450	7.4	9.3	11.6	14.4	18.2
xvii)	500	8.2	104	12.9	16.0	20.3
xviii)	560	9.2	11.6	14.4	17.9	22.7
xix)	630	10.3	13	16.2	20.1	25.5
xx)	7 10	11.6	14.7	18.3	22.7	28.7
xxi)	800	13.1	165	20.6	25.5	32.4
xxii)	900	14.7	18.6	23.1	28.7	36.4
xxiii)	1000	164	20.7	25.7	31.9	40.5
xxiv)	1200	19.6	24.8	30.8	38.3	48.5

8.1.2 Wall Thickness

The wall thickness of the pipes shall conform to values specified in Tables 4 to 7. The wall thickness shall be measured as per any test method specified in NS 558. The wall thickness of the pipe at any point shall confirm to the above requirement within tolerance specified at 8.1.2.1.

NOTES

I The wall thickness at any point may be measured either by cutting the pipe or by non-destructive method using suitable measuring instrument of desired least count and accuracy such as the use of ultrasonic wall thickness measurement gauge, etc.

2 The wall thicknesses have been calculated after applying a d-rating factor of 0.95 in view of standard temperature considered as 27°C.

8.1.2.1 Tolerance on wall thickness

The tolerance on nominal wall thickness, +y *[see* 8.1.2.1(a)**]**, shall as specified below unless these are specified by manufacturer.

a) The permissible variation between the minimum wall thickness (e_{min}) and the wall thickness at any point *(e),* (e - e_{min}) shall be positive in the form of +*y,* where y = 0.1e_{min} + 0.2 mm, and as per Table 8.

b) The average wall thickness shall be determined by taking at least six measurements of wall thickness round the pipe and including both the absolute minimum and absolute maximum measured values.

c) The results of these calculations for checking tolerance shall be rounded off to the next higher 0.1 mm.

NOTE— Due to the additional processing step of the orientation of the material, the spread on mean wall thickness of the PVC-O pipe could be increased.

8.1.3 Length

The pipes shall be supplied with the length not less than the declared nominal pipe length. It is recommended that the nominal pipe length to be supplied may be 6 m, 10 m and 12 m. The pipes may be supplied in other lengths where so agreed upon between the manufacturer and the purchaser.

8.2 Dimension of Integral Socket:

The minimum depth of engagement of Integral Sockets with elastomeric sealing ring type joints shall conform to Table : 9.

Attention is drawn to the fact that the depths of engagement required by Table 9 could be insufficient for PVC-O pipes under certain circumstances. It is recommended that the suitability of depth of engagement be verified. In Annex C, an example for the calculation of depth of engagement is given.

NOTE— There is no minimum wall thickness requirement for sealing ring type sockets. It is considered as being more relevant to verify the strength of the sockets as being at least the same as the strength of the pipe in accordance with 9.1.2.

8.3 Pipe Ends

Pipes with plain end(s) to be used with elastomeric sealing ring type joints shall have a chamfer end at approximately 15° to the axis of the pipe conforming to Fig. 1 (α to be approximately 15°).

Table: 5 Wall Thicknesses (mm) for Material Class 500/ C=1.4

Clause 8.1.2

S.N.	Nominal Diameter, d	Nominal Presuure			
		PN 12.5	PN 16	PN 20	PN 25
1	63	1.2	1.5	1.8	2.3
2	75	1.4	1.8	2.2	2.7
3	90	1.7	2.1	2.6	3.3
4	110	2	2.6	3.2	4
5	125	2.3	2.9	3.6	4.5
6	140	2.6	3.2	4	5.1
7	160	2.9	3.7	4.6	5.8
8	180	3.3	4.2	5.2	6.5
9	200	3.6	4.6	5.7	7.2
10	225	4.1	5.2	6.4	8.1
11	250	4.5	5.8	7.2	9
12	280	5.1	6.4	8	10.1
13	315	5.7	7.2	9	11.4
14	355	6.4	8.2	10.1	12.8
15	400	7.2	9.2	11.4	14.4
16	450	8.3	10.3	12.8	16.2
17	500	9.2	11.4	14.2	18
18	560	10.3	12.8	15.9	20.2
19	630	11.6	14.4	17.9	22.7
20	710	13.1	16.2	20.2	25.6
21	800	14.7	18.3	22.7	28.8
22	900	16.5	20.6	25.5	32.4
23	1000	18.4	22.8	28.4	36
24	1200	22	27.4	34	43.2

Table: 6 Wall Thicknesses(mm) for Material Class 450/ C=1.6
(Clause 8.1.2)

		Nominal Pressure				
S.N.	Nominal Diameter, d	PN 10	PN 12.5	PN 16	PN 20	PN 25
1	63	1.2	1.5	1.8	2.3	2.9
2	75	1.4	1.8	2.2	2.7	3.4
3	90	1.7	2.1	2.6	3.3	4.1
4	110	2	2.6	3.2	4	5
5	125	2.3	2.9	3.6	4.5	5.6
6	140	2.6	3.2	4	5.1	6.3
7	160	2.9	3.7	4.6	5.8	7.2
8	180	3.3	4.2	5.2	6.5	8.1
9	200	3.6	4.6	5.7	7.2	9
10	225	4.1	5.2	6.4	8.1	10.1
11	250	4.5	5.8	7.2	9	11.2
12	280	5.1	6.4	8	10.1	12.5
13	315	5.7	7.2	9	1 1.4	14.1
14	355	6.4	8.2	10.1	12.8	15.9
15	400	7.2	9.2	11.4	14.4	17.9
16	450	8.3	10.3	12.8	16.2	20.1
17	500	9.2	1 1.4	14.2	18	22.3
18	560	10.3	12.8	15.9	20.2	25
19	630	11.6	14.4	17.9	22.7	28.1
20	710	13.1	16.2	20.2	25.6	31.7
21	800	14.7	18.3	22.7	28.8	35.7
22	900	16.5	20.6	25.5	32.4	40.2
23	1000	18.4	22.8	28.4	36	44.6
24	1200	22	27.4	34	43.2	53.5

Table: 7 Wall Thicknesses(mm) for Material Class 500/ C=1.6

(Clause 8.1.2)

		Nominal Pressure				
S.N.	Nominal Diameter, d	PN 10	PN 12.5	PN 16	PN 20	PN 25
1	63	1.1	1.3	1.7	2.1	2.6
2	75	1.3	1.6	2	2.4	3.1
3	90	1.5	1.9	2.4	2.9	3.7
4	110	1.8	2.3	2.9	3.6	4.5
5	125	2.1	2.6	3.3	4	5.1
6	140	2.3	2.9	3.6	4.5	5.7
7	160	2.6	3.3	4.2	5.1	6.5
8	180	3	3.7	4.7	5.8	7.3
9	200	3.3	4.1	5.2	6.4	8.1
10	225	3.7	4.6	5.8	7.2	9.1
11	250	4.1	5.1	6.5	8	10.2
12	280	4.6	5.7	7.2	9	1 1.4
13	315	5.1	6.4	8.1	10.1	12.8
14	355	5.8	7.2	9.2	1 1.4	14.4
15	400	6.5	8.1	1 0.3	12.8	16.2
16	450	7.4	9.3	1 1.6	14.4	18.2
17	500	8.2	10.4	1 2.9	16	20.3
18	560	9.2	1 1.6	14.4	1 7.9	22.7
19	630	10.3	13	16.2	20.1	25.5
20	710	1 1.6	14.7	1 8.3	22.7	28.7
21	800	13.1	16.5	20.6	25.5	32.4
22	900	14.7	18.6	23.1	28.7	36.4
23	1000	1 6.4	20.7	25.7	31.9	40.5
24	1200	19.6	24.8	30.8	38.3	48.5

Table:-8
Tolerance on Wall Thickness (mm)

Clause 8.1.2.1

S.N.	Minimum Wall Thickness (mm)		Tolerance + y (mm)
	>	≤	
1	_	1	0.3
2	1	2	0.4
3	2	3	0.5
4	3	4	0.6
5	4	5	0.7
6	5	6	0.8
7	6	7	0.9
8	7	8	1
9	8	9	1.1
10	9	10	1.2
11	10	11	1.3
12	11	12	1.4
13	12	13	1.5
14	13	14	1.6
15	14	15	1.7
16	15	16	1.8
17	16	17	1.9
18	17	18	2
19	18	19	2.1
20	19	20	2.2
21	20	21	2.3
22	21	22	2.4
23	22	23	2.5
24	23	24	2.6

S.N.	Minimum Wall Thickness (mm)		Tolerance + y (mm)
	>	≤	
25	24	25	2.7
26	25	26	2.8
27	26	27	2.9
28	27	28	3
29	28	29	3.1
30	29	30	3.2
31	30	31	3.3
32	31	32	3.4
33	32	33	3.5
34	33	34	3.6
35	34	35	3.7
36	35	36	3.8
37	36	37	3.9
38	37	38	4
39	38	39	4.1
40	39	40	4.2
41	40	41	4.3
42	41	42	4.4
43	42	43	4.5
44	43	44	4.6
45	44	45	4.7
46	45	46	4.8
47	46	47	4.9
48	47	48	5
49	48	49	5.1
50	49	50	5.2

Table:-9			
Dimension of Sockets for Elastomeric Sealing Ring Joints (mm)			
Clause 8.2			
S.N.	Nominal Diameter in mm d_n	Minimum Depth of Engagement m_{min}	Minimum Mean inside diameter of Socket, $d_{in\ min}$
1	63	58	63.4
2	75	60	75.4
3	90	61	90.4
4	110	64	110.5
5	125	66	125.5
6	140	68	140.6
7	160	71	160.6
8	180	73	180.7
9	200	75	200.7
10	225	78	225.8
11	250	81	250.9
12	280	85	281
13	315	88	316.1
14	355	90	356.2
15	400	92	401.3
16	450	95	451.5
17	500	97	501.6
18	560	101	561.8
19	630	105	632
20	710	109	712.1
21	800	114	802.1
22	900	120	902.1
23	1000	125	1002.1
24	1200	136	1202.1

The value of m_{min} is calculated from the equations given below and as applicable:

$m_{min} = 50\ mm + 0.22 d_n - 2e$ when $d_n \leq 280$,
$m_{min} = 70\ mm + 0.15\ d_n - 2e$ when $d_n > 280$.

The value obtained shall be rounded to the next greater 1 mm.

Table:10 Test Parameters for the Determination of Resistance to Internal Hydrostatic Pressure, (Clause 9.1.1)

S.N.	Test	Temperature	Duration	Circumferential	
		Min	Min	Stress/Hoop Stress, σ Mpa	
		°C	H	PVCO-450	PVCO-500
1	Acceptance	27	10	57	62
2	Type	60	1000	28	31

Table 11 Classified Striker Mass and Drop Height Conditions for the Falling-Weight Impact Test, (Clause 9.2)

S.N.	Nominal Diameter, d	Total Mass	Drop Height
	mm	kg	m
	1	2	3
1	63	4	2
2	75	5	2
3	90	5	2
4	1 10	6.3	2
5	125	6.3	2
6	140	8	2
7	160	8	2
8	180	10	2.0
9	200	10	2.0
10	≥ 225	12.5	2.0

NOTE: Impact characteristics can change over time. These values are applicable only at the time of manufacture.

Table: 12 Ring Stiffness of Pipes, (Clause: 9.3)			
S.N.	Nominal Diameter	Ring Stiffness [1]	Ring Stiffness [2] (for Specific Jointing Techniques)
		kN/m²	kN/m²
1	63	≥ 6	≥ 20
2	75		≥ 12
3	90		≥ 10
4	110	≥ 4	≥ 10
5	125		≥ 8
6	140		≥ 7
7	160		≥ 7
8	≥ 200		≥ 6

1. Pipes of stiffness less than 4 kN/m² might not be suitable where high vacuum or external pressure could be developed, and could need special installation techniques where installed below ground.

2. Due to specific jointing techniques in water supply and installation below ground, higher stiffness may be needed.

NOTE— Minimum stiffness of pipes could be required for installation with some type of fittings. The sample calculation for calculating nominal stiffness of the pipes is given in Annex D.

9 MECHANICAL CHARACTERISTICS OF PIPES

9.1 Resistance to Hydrostatic Pressure

9.1.1 Pipes

Resistance to hydrostatic pressure shall be verified using the induced stresses derived from the analysis of the test data in accordance with NS.... ((Applicable Nepal standard)). For a period of 10 h at 27 °C and 1000 h at 27 °C, the 99.5 percent LPL value shall be taken as the minimum stress level.

For a period of 1000 h at 60 °C, the 99.5 percent LPL value established from analysis of test data at 60 °C in accordance with NS.... (Applicable Nepal standard) can be taken as the minimum stress level. In case of lack of data, alternatively, a value of 0.625 times the MRS value shall be taken as the minimum stress level.

When tested using either end cap Type A or Type B in accordance with NS 558, and using the combinations of test temperatures and induced stresses so derived, the pipe shall not fail in less than the times stated above.

The test shall be carried out not earlier than 24 h after the pipes have been manufactured

NOTE— All pipes that meet the requirements of Table 10 are deemed to meet the MRS requirement till the time of implementation of NS... (Applicable Nepal standard) in this standard.

9.1.2 Pipes with Integral Socket

Pipes when tested in accordance with NS 558, using the test procedure as given in 9.1.1, integral sealing ring sockets formed on pipes shall not fail in less than the time according to 9.1.1. Sockets will be tested only to the acceptance test (27 °C and 10 h). The length of the pipe section shall meet the requirements or specification given in 9.1.1. failure shall not occur in either pipe or socket sections.

9.2 Resistance to External Blows at 0 °C

Pipes when tested at 0°C in accordance with NS 558 using striker mass as given in col 3 of Table 11 and drop height for various nominal sizes as per col 4 of Table 11, shall have a true impact rate (TIR) of not more than 10 percent. The radius of the striker nose, R shall be 12.5 mm. In case of socket ended pipes, this test shall be carried out on the plain portion of the pipes taken at least 100 mm away from the route of the socket.

9.3 Ring Stiffness

The minimum value of ring stiffness of pipes when determined in accordance with NS 558 shall be as specified in Table 12.

9.4 Orientation Factor

The determination of the stretch ratios (axial orientation factor and circumferential orientation factor) may be carried out as per Annex E.

NOTE— When determining the orientation degrees in the circumferential and axial direction of the pipe, use is made of the fact that the oriented pipe in the rubber phase (above the glass/rubber transition temperature) will shrink till the initial dimensions determined by the extrusion process.

10. Physical and Chemical Characteristics

When tested in accordance with the test methods as specified in Table 13 using the parameters indicated therein, the pipe shall have physical and chemical characteristics conforming to the requirements given in Table 13.

11 Mechanical Characteristics of Assemblies Including Joints

11.1 Assemblies with Non-End-Load-Bearing Joints

The following types of assemblies with non-end-load- bearing joints shall fulfil the fitness for purpose requirements given in 11.2 to 11.4 and Tables 14, 15 and 16 as applicable:

a) integrally socketed PVCO pipe to pipe assemblies with elastomeric ring seal joints conforming to this standard;
b) Metal fitting and PVC-O pipe assemblies with elastomeric ring seal joints;
c) Metal valve and PVC-O pipe assemblies with elastomeric ring seal joints; and
d) Mechanical joint assemblies with PVC-O pipes.

11.2 Short-Term Pressure Test for Leak Tightness of Assemblies

11.2.1 Test Procedure

When an assembly with one or more elastomeric sealing ring type joints is tested using a hydrostatic pressure and angular deflection in accordance with NS... Applicable Nepal standard, and the test conditions given in Table 14.

11.2.2 Test Pressure

The test pressures P_T shall be calculated by using the following equation:

$$P_T = f \times PN \times f_t$$

where

PN=nominal pressure,

F = multiplying factor (to be obtained from Fig. 2),

P_T =test pressure, and

f_t= de-rating factor.

11.3 Short-Term Negative Pressure Test for Leak Tightness of Assemblies

When an assembly with one or more elastomeric sealing ring type joints is tested using a negative pressure with angular deflection and the deformation in accordance with NS 558, and the test conditions given in Table 15, the assembly shall conform to the requirement given in Table 15. Procedure for calculating negative pressure capability of pipes for different class and design coefficient is given in Annex F.

Table 13 Physical and Chemical Characteristics
(Clause 10)

S.N.	Characteristics	Requirement	Test parameters	Test Method Refer to
i.	Vicat softening temperature *	≥ 80 °C	Shall conform to NS 558, arid Number of test pieces = 3	NS 558
ii.	Effect on water	As per NS 206	NS 558	NS 558
iii.	Resistance to Di-chloromethane at a specific temperature (degree of gelation*)	No attack at any part of the test piece,	Temperature of bath = 15 ± 1 °C, immersion time = 15 min, and minimum wall thickness = 1.5 mm	NS 558
iv.	Alternative test to resistance to di-chloromethaneiest Uni-axial tensile test	Minimum stress 48 MPa	In accordance with di-chloromethaneiest: NS 558	NS 558

* To be carried out on feedstock pipe or on reverted pipe.

Table 14 Test Conditions and Requirements for Short-Term Assemble Test

(Clause 11.2.1)

S.N.	Test Temeperature °C	Test Pressure Mpa	Test Time min	Test Requirement
i.	£ = 2 (where Z is any temperature between 20°C and 27 c	Pressure is Calculated in accordance with Fig. 2 and 11.2.2	One cycle in accordance with Fig 2	No leakage at and point of the jointing areas throughout the whole test cycle

NOTE— The pressure changes from one pressure level to the next shall take place within the periods indicated, but need not take place as strictly linear rates.

Table 15 Test Conditions and Requirements for Short-Term Negative - Pressure Assemble Test

(Clause 11.3)

Test Temperature °C	Test Pressure Mpa	Test Time min	Test Requirement
T ± 2 Where, T is any temperature between 20°C and 27°C	Pressure is Calculated in accordance with Fig. 3	One cycle in accordance with Fig 3	The change in negative pressure shall be not more than 0.005 MPa during each 15 min test period shown in Fig 3

Notes:

1 The pressure change from one pressure level to the next, need not take place at strictly Linear rates.
2 For pipes with integral sockets, there is no need for testing with angular deflection.
3 For pipes of ring stiffness less than 4 kN/m^2, it is a flowed to support the pipe to avoid collapsing during testing.
4 Sample calculation and method to be adopted for calculation of negative pressure capability of the pipes is given at Annex F.

11.4 Long-Term Pressure Test for Leak Tightness

When an assembly with one or more joints selected from elastomeric sealing ring type sockets and other end-load-bearing and non-end-load-bearing joints for oriented PVC-U components for a piping system is tested in accordance with NS 558, using the test conditions given in Table 16 for the test temperatures of 27°C and 40°C, the assembly shall conform to the requirement given in Table 16.

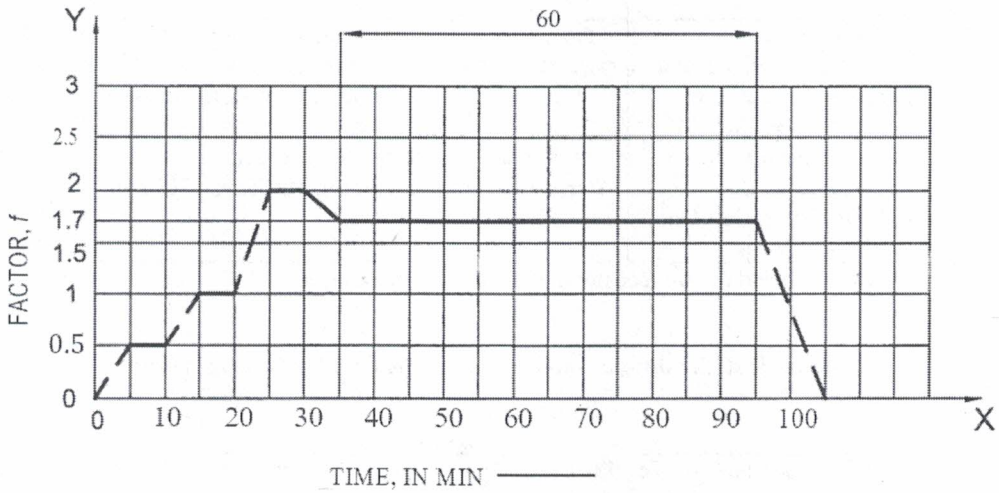


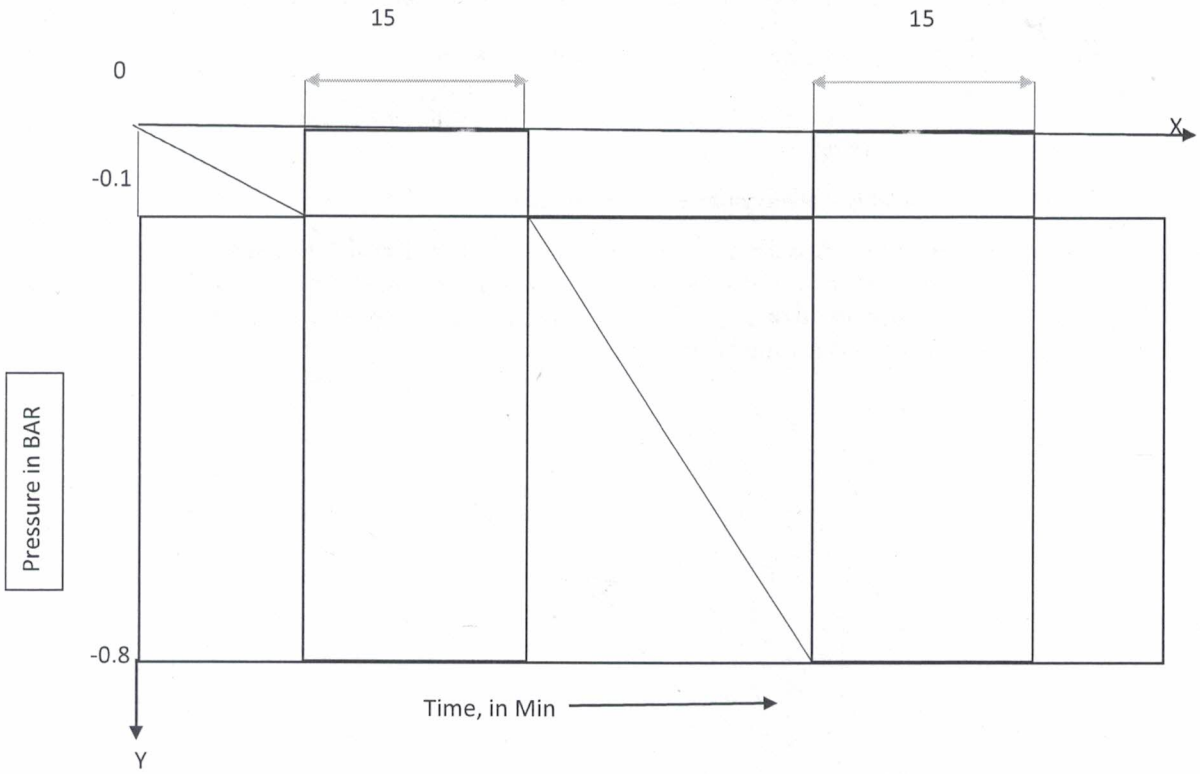
FIG. 2 HYDROSTATIC PRESSURE TEST REGIME

Table 16 Test Requirements for the Long-Term Pressure Testing of Assembled Joint

(Clause 11.4)

S.N.	Test Temperature °C	Test Pressure Mpa	Test Time Hour	Test Requirement
i.	27°C	1.3 PN	1000	No leakage at any point of the jointing areas at least for the test time
ii	40°C	1.1 PN	1000	No leakage at any point of the jointing areas at least for the test time

Note: The PN rating to be taken to calculate the test pressure shall be the PN rating of the fitting, and if pipe with an integral joint is being tested, it shall be the PN rating of the pipe.



Note: 1 bar=0.1 Mpa

Fig: -3 Negative-Pressure Test Regime

12 ELASTOMERIC SEALS

Elastomeric seals used for joining components shall conform to both the following requirements:

a) Rings shall conform to the material requirements specified in NS…. (Applicable NS).
b) Rings shall be free from chemical agents such as plasticizers that could have a detrimental effect on the pipes or fittings, or on the quality of the water.

13 SAMPLING AND CRITERIA FOR CONFORMITY

The sampling procedure and the criteria for conformity shall be as given in Annex G.

14 MARKING

14.1 Each pipe shall be clearly and indelibly marked in ink/paint or hot embossed on white base at an interval not more than 1 m. The markings shall include the following:

a) Manufacturer's name and/or trade-mark;
b) Pipe material and material classification number,
c) Nominal outside diameter, d_n
d) Nominal pressure, PN;
e) Reference to this standard;
f) C-factor; and
g) Batch number.

For example: Marking may be as given below: Trade-mark PVC-O 450 DN160 PN16 C1.6 Batch Number

14.1.1 The batch number shall include the details of production in the following manner:

Year	Month	Day	Machine No.	Shift
xxxx	xx	xx	xxx	xxx

14.2 NS Certification Marking

Each pipe may also be suitably marked with the Standard Mark.

14.2.1 The use of Standard Mark is governed by the provisions of the Nepal Standard (Certification Mark) Act 2037 and the Rules and Regulations made thereunder. The details of conditions under which a license for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Nepal Bureau of Standards and Metrology.

ANNEX A

(Clause 2)

List of Referred Standards

NS No.	Title	NS No.	Title
XX...:XXXX	Methods of tests for polyvinyl chloride resin	---------	----------
XX...:XXXX /ISO 24153:2009	Random sampling and randomization procedures (First Revision)	145	Random Sampling Method
XX...:XXXX	Unplasticized PVC pipes for potable water supplies- specification (First Revision)	206	Unplasticized PVC pipes for potable water supplies-specification
XX...:XXXX	Rubber sealing rings for gas mains, water mains and sewers (First Revision)	--------	----------
XX...:XXXX	Positive list of constituents of polyvinyl chloride resins and its copolymers for safe use in contact with foodstuffs, pharmaceuticals and drinking water	555	Positive List of Constituents of Polypropylene and its Copolymers in Contact with Foodstuffs, Pharmaceuticals and Drinking Water
XX...:XXXX	Specification for polyvinyl chloride (PVC) and its copolymers for its safe use in contact with foodstuffs, pharmaceutical and drinking water	XX.....: XXXX	Specification for Polypropylene and its Copolymers for its Safe use in Contact with Foodstuffs, Pharmaceuticals and Drinking Water
XX...:XXXX	Thermoplastics pipes and fittings – Methods of test (First Revision)	558	Thermoplastic Pipes and Fittings - Methods of Tests
(Part1):xxxx	Measurement of dimensions	Part 1	Measurement of dimensions
(Part2): xxxx	Determination of Vicat softening temperature	Part 2	Determination of Vicat softening temperature
(Part3): xxxx	Test for Opacity	Part 3	Test for Opacity
(Part4): xxxx	Determination of detrimental effect on the composition of water	Part 4	Determination of detrimental effect on the composition of water
(Part5/Sec1): xxxx	Longitudinal reversion, Section 1 Determination method	Part 5 Sec 1	Longitudinal reversion, Section 1 Determination method
(Part5/Sec2): xxxx	Longitudinal reversion, Section 2 Determination parameters	Part 5 Sec 2	Longitudinal reversion, Section 2 Determination parameters
(Part8/Sec1): xxxx	Resistance to internal hydrostatic pressure, Section 1 Resistance to internal hydrostatic pressure at constant internal water pressure	Part 8 Sec 1	Resistance to internal hydrostatic pressure, Section 1 Resistance to internal hydrostatic pressure at constant internal water pressure
(Part8/Sec2): xxxx	Resistance to internal hydrostatic pressure, Section 2 Leak-tightness of elastomeric sealing ring type socket joints under positive internal pressure and with angular deflection	Part 8 Sec 2	Resistance to internal hydrostatic pressure, Section 2 Leak-tightness of elastomeric sealing ring type socket joints under positive internal pressure and with angular deflection
(Part8/Sec3): xxxx	Resistance to internal hydrostatic pressure, Section 3 Leak-tightness of elastomeric sealing ring type socket joints under negative internal pressure and with angular deflection	Part 8 Sec 3	Resistance to internal hydrostatic pressure, Section 3 Leak-tightness of elastomeric sealing ring type socket joints under negative internal pressure and with angular deflection

(Part8/Sec4): xxxx	Resistance to internal hydrostatic pressure, Section 4 Leak-tightness of elastomeric sealing ring type socket joints under positive internal pressure and without angular deflection	Part 8 Sec 4	Resistance to internal hydrostatic pressure, Section 4 Leak-tightness of elastomeric sealing ring type socket joints under positive internal pressure and without angular deflection
(Part9): xxxx	Resistance to external blows (impact resistance) at 0^0C (round-the-clock method).	Part 9	Resistance to external blows (impact resistance) at 0^0C (round-the-clock method).
(Part10): xxxx	Determination of organotin as tin aqueous solution	Part 10	Determination of organotin as tin aqueous solution
(Part11): xxxx	Resistance to dichloromethane at specified temperature	Part 11	Resistance to dichloromethane at specified temperature
(Part13): xxxx	Determination of tensile strength and elongation	Part 13	Determination of tensile strength and elongation
(Part4): xxxx	Determination of density/relative density (specific gravity)	Part 14	Determination of density/relative density (specific gravity)
(Part18): xxxx	Determination of ring stiffness		
XX…:XXXX	Unplasticized non-pressure polyvinyl chloride (UPVC) pipes for use in underground drainage and sewerage system - specification	XX…: XXXX	Unplasticized non-pressure Polyvinyl Chloride (UPVC) pipes for use in underground drainage and sewerage system - Specification
16130:2014/ ISO 12162:2009	Thermoplastics materials for pipes and fittings for pressure applications – Classification and designation overall service (design) coefficient	---------	----------
16462:2016/ ISO 9080:2012	Plastic piping and ducting systems – Determination of the long term hydrostatic strength of thermoplastics materials in pipe form by extrapolation	---------	----------

ANNEX B

(Table 2)

B-1 Temperature de-rating information given in Fig. 4 may be used as a guide unless real figures from manufacturers are available

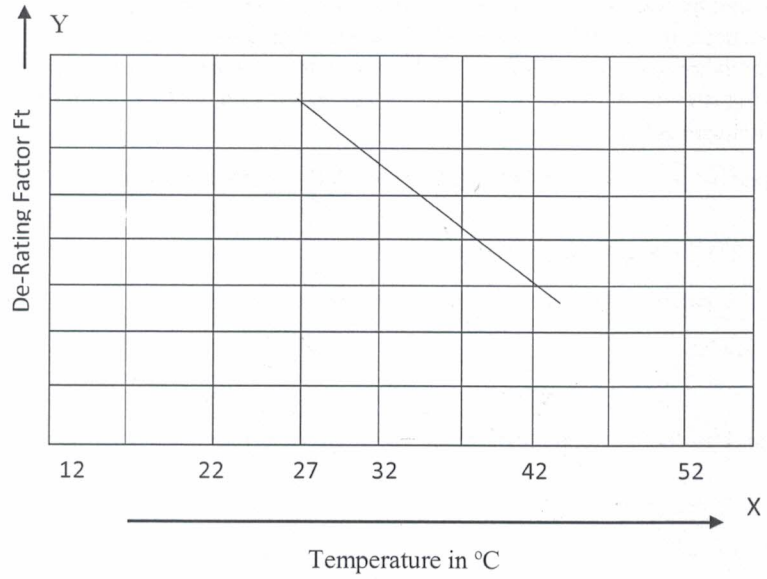


Fig:-4 DE-RATING FACTOR, AS A FUNCTION OF OPERATION TEMPERATURE

ANNEX C

(Clause 8.2)

MINIMUM DEPTH OF ENGAGEMENT OF SOCKETS

C-1 GENERAL

The minimum depth of engagement of integral sockets with elastomeric sealing ring type joints is given in [7.2.1.2(a) and Table 5 of NS... (Applicable Nepal standard). Attention is drawn to the fact that the depths of engagement required by NS... (Applicable Nepal standard) could be insufficient for PVC-O pipes under certain circumstances, particularly pipes of length greater than 6 m, and could result in pull-out and leakage under adverse conditions. Primarily, this is due to the higher strain levels developed at the higher operating stresses invoked in PVC-O pipes, compared with the PVC-U pipes covered in NS... (Applicable Nepal standard).

The potential for pull-out also exists with short- socketed fittings of PVC or other materials used in conjunction with PVC-O pipes.

C-2 CALCULATION OF DEPTH OF ENGAGEMENT

C-2.1 Depth of engagement, m, is calculated by: $m = m_p+m_t+m_a+m_c+m_s$

Where m is the sum of C-2.2 to C-2.6.

C-2.2 Poisson Contraction

Shortening of length, m_p, in millimeters, when pressurized shall be as given below:

$$m_p = \frac{L \times \mu \times \sigma}{E_c}$$

Where,
L =length of pipe, in m;
μ =Poisson's ratio (0.45);
σ =hydrostatic stress in the circumferential direction, in MPa; and
E_c = Elastic Modulus in the circumferential direction (2.0 GPa).
σ is usually taken as the long-term operating stress at working pressure, or the design stress for the pipe material, and as the long-term creep modulus.
Example: for an MRS 500 Pipe and C=1.6, σ_s=32 Mpa, then m_p= 6 X 0.45 X 32/2 = 43 mm

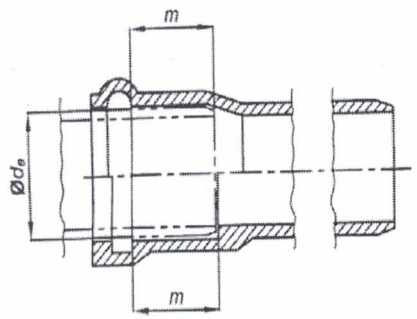


FIG:- 5 DEPTH OF ENGAGEMENT

For buried pipelines, resistance to contraction is offered by the soil and the full Poisson contraction is unlikely to be realized. However, an unrestrained above-ground pipeline can be subject to the full contraction. A worst- case situation arises during field testing of lines not yet back-filled, where a test pressure margin of 25 percent could be applied.

Example: With a short-term modulus of 4.0 GPa,
m_p= 6 X 0.45 X 32 X 1.25/2 = 27 mm
C-2.3 Temperature Contraction
Shortening due to drop in temperature, m_t in millimeters, is given as below:
$m_t = L \times \alpha \times \Delta T \times 10^3$
where,
L = length of pipe, in m;
α = coefficient of linear expansion = (7×10^{-5}) °C^{-1}; and
ΔT = temperature differential, in °C.

This can occur, for example, during construction as a result of filling the pipeline with water. Again, for buried pipelines, soil friction will reduce the range of movement, but above ground lines could realize the full contraction. Some specifications also require an expansion gap to be allowed between the spigot and the back of the socket to accommodate a possible rise in temperature.

Example— A total temperature differential ΔT of 50 °C gives $m_t = 6 \times 7 \times 10 \times 50 \times 10^3 = 21$ mm.

C-2.4 Angular Deflection

Retraction of one side of the spigot due to angular deflection of the spigot within the socket, in millimeters, is given by:

$$m_a = \frac{d_e \times \theta \times \pi}{180}$$

Where,

θ = Maximum angle of deflection of spigot within socket degrees.

Most parallel joints are capable of spigot/socket deflection of less than 1 °.
For a DN 315 joint, this gives = 315 X π / 180=5 mm

Deflection joints can have greater capability and require proportionately more allowance.

C-2.5 Chamfer Length

Length of chamfer, c, in millimeters, shall be included in the available depth of engagement, as per the manufacturer's specification.

Example– For DN 315, m_c =c = 25 mm.
C-2.6 Safety **Allowance (S)**
For construction error, m_s.
Example m_s = S = 20 mm.
C-2.7 The sum of the above allowances for a 6 m, DN 315 pipe,

$$m = m_p + m_t + m_a + m_s = 114 \text{ mm}$$

The standard engagement length should be 118 mm.
Where full Poisson contraction can occur, this joint would be inadequate for a 12 m pipe length.

ANNEX D

(Table 12)

RING STIFFNESS OF PIPES

D -1 CALCULATION OF INITIAL RING STIFFNESS

For design purposes, the calculated initial ring stiffness of the pipes can be derived from Table 19.

Table: 19 Initial Ring Stiffness of Pipes

(Clause D-1)

		Nominal Presuure (PN)				
S.N.	Class C	PN 10	PN 12.5	PN 16	PN 20	PN 25
1	450/1.4	1.6	3.1	6.3	12.1	25.2
2	450/1.6	2.2	4.4	8.5	17.5	34.5
3	500/1.4	--	2.2	4.4	8.5	17.5
4	500/1.6	1.6	3.1	6.3	12.1	25.2

These values are calculated from the formula:

$$\text{Scale} = \frac{E \times I}{(d_n - e_n)}$$

Where

S_{calc} = Calculated initial ring stiffness, in kN/m^2;

E = Young's modulus:

a) for pipe class 315, $E = 3.5 \times 10^6 kN/m^2$,

b) for pipe class 355 and higher, $E = 4 \times 10^6 kN/m^2$

I = moment of inertia $= 1/12\ e_n^3$, in cubic millimeter per meter (mm^3/m)

NOTE — The stiffness values are calculated on the basis of minimum wall thickness at any point $e_{y.min} = e_n$ (see 3.7). Since the stiffness is a function of the mean wall thickness, it is statistically not possible for these values to be realized in practice, and the real stiffness will be significantly greater. For a tolerance of 15 percent of wall thickness (Grade T), the mean could reasonably be expected to be around 5 percent over minimum, and the stiffness correspondingly 16 percent higher than the above results.

ANNEX E

(Foreword and Clause 9.4)

DETERMINATION OF AXIAL AND CIRCUMFERENTIAL ORIENTATION FACTOR

E-1 PRINCIPLE

A piece of pipe is measured under identical conditions before and after heating in the oven at a specified temperature for a specified duration. The reversion is calculated as the percentage variation in length, diameter, and wall thickness in relation to the initial values. The test pieces areexamined on any changes inappearance, forexample bubbles and cracks.

E-2 METHOD

The axial and circumferential orientation factor shall be determined according to NS 558.

E-3 TEST PARAMETERS

Specimen length : 300 mm

Distance between the marks : 200 mm

Test temperature :150 ± 2°C

where,

Medium: Air

Immersion time: 60 or 120 min

Number of test pieces :3

E-4 TEST PROCEDURE

The test is carried out according to NS 558.

The axial orientation factor, λis calculated as:

$$\lambda_a = \frac{L_0}{L_1}$$

L_0 = measured length before conditioning, in mm; and

L_1 = measured length after conditioning, in mm;

The circumferential orientation factor, λ_c, is calculated as:

$$\lambda_c = \frac{D_{em} - e_{em}}{D_i - e_i}$$

where

D_{em} — measured outside diameter before conditioning, in mm

e_{em} = mean wall thickness before conditioning, in mm

e_i = mean wall thickness after conditioning, in mm

E-5 SAMPLING

Three test pieces are cut at random from the pipes.

ANNEX F

(Clause 11.3)

NEGATIVE PRESSURE CAPABILITY OF PIPES

F-1 Pipes can be subjected to unstable buckling under negative pressure conditions due to vacuum and/or external or groundwater pressure, if unsupported by soil or other lateral stiffening devices (see Table 20).

Table: 20 Negative Pressure Capabilities of Pipes (Pcr) kPa

(Clause 11.3)

		Nominal Pressure (PN)				
S.N.	Class C	PN 10	PN 12.5	PN 16	PN 20	PN 25
1	450/1.4	48	93	190	364	758
2	450/1.6	66	132	256	527	1038
3	500/1.4	--	66	132	256	527
4	500/1.6	48	93	190	364	758

These values have been calculated from the formula:

$$P_{cr} = \frac{24\, S_{calc}}{(1-\nu^2)}$$

Where

$P_{cr\,=\,unsupported}$ critical buckling pressure, in kilopascals (kPa);
$S_{calc\,=}$ calculated initial ring stiffness, in kN/m^2; and
ν = Poisson's ratio, which can be assumed as 0.45.

NOTE— The critical buckling pressure may can likewise be expected to be around 16 percent higher than these values in practice. No other design coefficient is incorporated. When pipes are buried with cover exceeding two diameters, lateral soil support will increase buckling pressures significantly. Users should refer to appropriate engineering texts for advisory material.

ANNEX G

(*Clause* 13)

SAMPLING AND CRITERIA FOR CONFORMITY

G-1 ACCEPTANCE

Acceptance tests are carried out on samples selected from a lot for the purpose of acceptance of the lot.

G-1.2 Lot

All PVC-O pipes in a single consignment of the same grade, same nominal pressure, same size and manufactured under essentially similar conditions shall constitute a lot.

G-1.3 For ascertaining conformity of the lot to the requirements of the specification, samples shall be tested from each lot separately.

G-1.4 Visual and Dimensional Requirements

G-1.4.1 The number of test samples to be taken from a lot shall depend on the size of the lot and the outside diameter of the pipes, and shall be in accordance with Table 21.

G-1.4.2 These pipes shall be selected at random from the lot and in order to ensure the randomness of selection, a random number table shall be used. For guidance and use of random number tables, NS... (Applicable Nepal standard) may be referred to. In the absence of a random number table, the following procedure may be adopted:

Starting from any pipe in the lot, count them as 1, 2, 3, etc. up to *r* and so on, where *r* is the integral part of *N/n,* where N being the number of pipes in the lot, and *n* the number of pipes in the sample. Every r^{th} pipe so counted shall be withdrawn so as to constitute the required sample size.

G-1.4.3 The number of pipes given for the first sample in col 4 of Table 21, shall be taken from the lot and examined for visual appearance, colour and dimensional requirements given in 7.1, 7.2 and 8. A pipe failing to satisfy any of these requirements shall be considered as defective. The lot shall be deemed to have satisfied these requirements, if the number of defectives found in the first sample is less than or equal to the corresponding acceptance number given in col 6 of Table 21. The lot shall be deemed not to have met these requirements, if the number of defectives found in the first sample is greater than or equal to the corresponding rejection number given in col 7 of Table 21. If, however, the number of defectives found in the first sample lies between the corresponding acceptance and rejection numbers given in col 6 and col 7, a second sample of the size given in col 4 shall be taken and examined for these requirements. The lot shall be considered to have satisfied these requirements, if the number of defectives found in the cumulative sample is less than or equal to the corresponding acceptance number given in col 6, otherwise not.

G-1.5 Vicat Softening Test

G-1.5.1 The lot, having satisfied, the requirements for visual appearance and colour and dimensional requirements as per G-1.4, shall be tested for Vicat softening temperature in accordance with S. No. (i) of Table 13.

G-1.5.2 for this purpose, the number of pipes given for the first sample in col 4 of Table 22 shall be taken from the lot. The sample pipe failing the Vicat softening test shall be considered as defective. The lot shall be deemed to have met the requirements given in this specification for the Vicat softening test, if the number of defectives found in the first sample is less than or equal to the corresponding acceptance number given in col 6. The lot shall be deemed not to have met these requirements, if the number of defectives found in the first sample is greater than or equal to the corresponding rejection

number given in col 6. If, however, the number of defectives in the first sample lies between the corresponding acceptance and rejection numbers given in col 6 and col 7, a second sample of size given in col4 shall be taken and examined for the requirement. The lot shall be considered to have satisfied the requirements, if the number of defectives found in the cumulative sample is less than or equal to the corresponding acceptance number given in col 6, otherwise not.

G-1.6 Density

G-1.6.1 The lot, having satisfied, the requirements for visual appearance and colour and dimensional requirements as per G-1.4, shall be tested for density in accordance with 5.5.

G-1.6.2 For this purpose, the procedure adopted for sampling and criteria for conformity shall be the same as that given in Table 22.

G-1.7 Resistance to External Blows at 0 °C

G-1.7.1 The lot, having been found satisfactory according to G-1.4, G-1.5 and G-1.6 shall be tested for resistance to external blows at 0°C as per 9.2.

G-1.7.2 For this purpose, the procedure adopted for sampling and criteria for conformity shall be as specified in Annex C of NS 206 and Table 23.

G-1.8 Resistance to Internal Hydrostatic Pressure Test (Acceptance Test) and Short Term Negative Pressure Test for Leak Tightness of Assemblies

G-1.8.1 The lot, having been found satisfactory according to G-1.4, G-1.5, G-1.6 and G-1.7 shall be subjected to the requirements of the acceptance test for resistance to internal hydraulic pressure [*see* S. No. (i) of Table 10] and short-term negative pressure test for leak-tightness of assemblies *(see* **11.3).** The number of pipes to be taken from the lot shall depend on the size of the lot and shall be according to Table 24.

G-1.8.2 The pipes shall be taken at random from the lot. In order to ensure the randomness of selection, procedures given in NS 145 may be followed.

G-1.8.3 Number of Tests and Criteria for Conformity

The number of test samples shall be as given in Table 24. The lot shall be considered to have satisfied the requirements for this test, if the number of test samples failing in this requirement is equal to the corresponding acceptance number given in col 4 of Table 24.

G-1.9 RESISTANCE TO DI-CHLOROMETHANE

The lot having satisfied the requirements for visual appearance and colour and dimensional requirements as per G-1.4 shall be tested for resistance to dichloromethane as per SI No. (iii) of Table 13. For this purpose, sub-sample from those already tested and satisfying the requirements of G-1.4 shall be drawn as given in col 5 of Table 24 or Table 25, as appropriate for the first/second sample size. The lot shall be deemed to have met the requirements given in the corresponding acceptance number given in col 6 of Table 24 or Table25, as relevant. The lot shall be deemed not to have met these requirements, if the number of defectives found in the first sample is greater than or equal to the corresponding rejection number given in col 7 of Table 24 or Table 25. If, however the number of defectives found in the first samples lies between corresponding acceptance and rejection number given in col 6 and col 7 of Table 24 or Table 25, a second sample size given in col 4 of Table 24 or Table 25 shall be taken and examined for requirements. The lot shall be considered to have satisfied the requirements, if number of defective found in the cumulative sample is less than or equal to the corresponding acceptance number given in col 6 of Table 24 or Table 25, as appropriate, otherwise not.

G-1.10 UNIAXIAL TENSILE STRENGTH

G-1.10.1 Number of Test Specimens

For this purpose, the procedure adopted for sampling shall be as per G-1.9 and the test shall be performed as per S.No. (iv) of Table 13. However, the number of sub-samples to be selected and criteria for conformity shall be as per Table 27.

G-1.11 Ring Stiffness Test

The lot having satisfied the requirements for visual appearance and colour and dimensional requirements as per G-1.4 shall be tested for requirements of ring stiffness as per 9.3. The number of pipes to be taken from the lot shall depend on the size of the lot and shall be according to Table 28. If the first sample drawn fails the test, resampling should be done from the lot which has satisfied the dimensional and visual requirements. The lot shall be considered to have met the requirements of these tests, if none of these samples tested fails.

G-2 TYPE TESTS

G-2.1 Type tests are intended to prove the suitability and performance of a new composition or a new size of pipe. Such tests, therefore, need to be applied only when a change is made in polymer composition or when a new size of pipe is to be introduced. Type tests for compliance with G-2.2, G-2.3 and G-2.4 shall be carried out.

G-2.2 Opacity

For this test, the manufacturer or the supplier shall furnish to the testing authority, one sample of the pipe of the thinnest wall section, selected preferably from a regular production lot.

G-2.2.1 The sample so selected shall be tested for compliance with requirements for opacity as given in 7.3.

G-2.2.2 If the sample passes the requirements of the opacity test, the type of the pipe under consideration shall be considered to be eligible for approval, which shall be valid for a period of one year.

G-2.2.3 In case the sample fails in the test, the testing authority, at its discretion, may call for a fresh sample and subject the same to the opacity test. If the sample passes the repeat test, the type of pipe under consideration shall be considered eligible for approval. If the sample fails in the repeat test, the type of pipe shall not be approved. The manufacturer or the supplier may be asked to improve the design and resubmit the product for type approval.

G-2.2.4 At the end of the validity period (normally one year) or earlier, if necessary, the testing authority may call for a fresh sample for opacity test for the purpose of type approval.

Table 21 Scale of Sampling for Visual Appearance, Colour and Dimensional Requirements

(Clause G1.4.1 and G 1.4.3)

S.N	Number of Pipes in a lot	Sample Number	Sample size	Cummulative Sample Size	Acceptance Number	Rejection Number
1	Upto 1000	First	13	13	0	2
		Second	13	26	1	2
2	1001 to 3000	First	20	20	0	2
		Second	20	40	1	2
3	3001 to 10000	First	32	32	0	3
		Second	32	64	3	4
4	10001 and above	First	50	50	1	4
		Second	50	100	4	5

Table 22 Scale of Sampling for Vicat Softening Temperature and Density Test

S.N	Number of Pipes in a lot	Sample Number	Sample size	Cummulative Sample Size	Acceptance Number	Rejection Number
	i) for d upto and including 110 mm					
1	Upto 1000	First	5	5	0	2
		Second	5	10	1	2
2	1001 to 3000	First	8	8	0	2
		Second	8	16	1	2
3	3001 to 10000	First	13	13	0	2
		Second	13	26	1	2
4	10001 and above	First	20	20	0	3
		Second	20	40	3	4
	ii) for d above 110 mm					
a.	Upto 1000	First	3	3	0	2
		Second	3	6	1	2
b.	1001 to 3000	First	5	5	0	2
		Second	5	10	1	2
c.	3001 to 10000	First	8	8	0	2
		Second	8	16	1	2

Table 23 Scale of Sampling for Resistance to External Blows at 0°C

(Clause G 1.7.2)

S.N.	Number of Pipes in a lot	Sample Number	Sample size	Cummulative Sample Size	Acceptance Number	Rejection Number
1	Upto 3000	First	3	3	0	2
		Second	3	6	1	2
2	3000 to 10000	First	5	5	0	2
		Second	5	10	1	2
3	10001 and above	First	8	8	0	2
		Second	8	16	1	2

NOTE: The numbers mentioned in col 4 to col 7 represent the number of times the test is to be carried out and do not represent either the number of pipe samples or number of blows or number of failures.

Table 24 Scale of Sampling for Internal Hydrostatic Test

(Clause G 1.8.1 and G 1.8.3)

S.N.	Number of Pipes in a lot	Sample size	Acceptance Number
1	Upto 3000	**2**	**0**
2	3001 to 10000	**3**	**0**
3	10001 and above	**5**	**0**

Table 25 Scale of Sampling for Resistance **to Dichloromethane Tests (For DN up to and Including** 110 **mm)**

(Clause G-1.9)

S.N.	Number of Pipes in a lot	Sample Number	Sample size	Cummulative Sample Size	Acceptance Number	Rejection Number
1	Upto 1000	First	**5**	**5**	**0**	**2**
		Second	**5**	**10**	**1**	**2**
2	1001 to 3000	First	**8**	**8**	**0**	**2**
		Second	**8**	**16**	**1**	**2**
3	3000 to 10000	First	**13**	**13**	**0**	**2**
		Second	**13**	**26**	**1**	**2**
4	10001 and above	First	**20**	**20**	**0**	**3**
		Second	**20**	**40**	**3**	**4**

Table 26 Scale of Sampling for Resistance to Dichloromethane Tests (For DN above 110 mm)

(Clause G-1.9)

S.N.	Number of Pipes in a lot	Sample Number	Sample size	Cummulative Sample Size	Acceptance Number	Rejection Number
1	Upto 3000	First	**3**	**3**	**0**	**2**
		Second	**3**	**6**	**1**	**2**
2	3000 to 10000	First	**5**	**5**	**0**	**2**
		Second	**5**	**10**	**1**	**2**
3	10001 and above	First	**8**	**8**	**0**	**2**
		Second	**8**	**16**	**1**	**2**

Table 27 Scale of Sampling for Uniaxial Tensile Test **(For DN 40 to 315 mm)**

(Clause G-1.10.1)

S.N.	Number of Pipes in a lot	Sample Number	Sample size	Cummulative Sample Size	Acceptance Number	Rejection Number
1	Upto 3000	First	3	3	0	2
		Second	3	6	1	2
2	3001 to 10000	First	5	5	0	2
		Second	5	10	1	2
3	10001 and above	First	8	8	0	2
		Second	8	16	1	2

Table 28 Scale of Sampling for Ring Stiffness Test

(Clause G- 1.11)

S.N.	Number of Pipes in a lot	Sample size for sizes less than or equal to 500 mm	Sample size for sizes greater than 500 mm
1	Upto 1000	2	1
2	1001 to 3000	3	2
3	3001 and above	4	3

G-2.3 Test for Effect on Water

For this type test, the manufacturer or the supplier shall furnish to the testing authority three samples of the smallest size of pipe taken from each machine (selected preferably from a regular production lot).

G-2.3.1 Three samples so selected shall be tested for compliance with the requirements for effect on water as given in S.No. (ii) of Table 13.

G-2.3.2 If all three samples pass the requirements for effect on water, the type test of the pipe under consideration shall be considered to be eligible for approval, which shall be normally valid for a period of one year.

G-2.3.3 In case any of the samples fails in this test, the testing authority, at its discretion, may call for fresh samples not exceeding the original number, and subject them to the test for effect on water. If, in the repeat test, no single failure occurs, the type of pipe under consideration shall be considered eligible for type approval. If any of the samples fails in the repeat test, the type of pipe shall not be approved. The manufacturer or the supplier may be asked to improve the design and resubmit the product for type approval.

G-2.3.4 At the end of the validity period (normally one year) or earlier, if necessary, the testing authority may call for fresh samples for effect on water test for the purpose of type approval.

G-2.4 Short-Term Pressure Test for Leak Tightness of Assemblies and Long Term Pressure Test for Leak Tightness of Assemblies

G-2.4.1 For this test, the manufacturer or the supplier shall supply furnish to the testing authority, three samples of pipes of different diameters and different classes, selected preferably from a regular production lot.

G-2.4.2 Three samples, so selected, shall be tested for compliance with the requirements of the test given in **11.2** and **11.4.**

G-2.4.3 If all the three samples pass the requirements of the quality test, the type of pipe under consideration shall be considered to be eligible for approval, which shall be normally valid for a period of one year.

G-2.4.4 In case any of the samples fail in this test, the testing authority, at its discretion, may call for fresh samples not exceeding the original number and subject them to the type test. If, in the repeat test, no single failure occurs, type of pipe shall be considered for type approval. If any of the samples fails in the repeat tests, the type of pipe shall not be approved. The manufacturer or the supplier may be asked to improve the design and resubmit the product for type approval.

G-2.4.5 At the end of the validity period (normally one year) or earlier, if necessary, the testing authority may call for fresh samples for type test for the purpose of type approval.

ANNEX H

(Foreword)

GUIDE LINES FOR STORAGE AND INSTALLATION

H-1 STORAGE

The following guidelines for storage of PVC-O pipes is suggested:

a) Store the pipes horizontally on a flat surface and place supports every 1.5 m to avoid the bending of the product.

b) Avoid scratches especially in the crest of the socket, due to dragging the pipe on the ground, mainly if the surface is made of stone, concrete or asphalt.

c) Do not stack pipes more than 1.5 m height, as this can damage lower pipes or even the upper pipes can fall.

d) The sockets should be free, alternating sockets and ends.

e) In case of prolonged sun exposure, protect pallets with an opaque material. White colour is preferable le because it avoids the over- heating of the pipes.

H-2 REALIZATION OF THE TRENCH

The trench shall be free of stones at the bottom and at the sides. Stones smaller than 10 - 20 mm are allowed, but it cannot be the main size of the ground particles. Minimum width of the trench based on nominal diameter of pipes to be laid and/or depth of trench is specified in Table 29 and Table 30, respectively.

As a rule of thumb, when there is no road traffic involved, the pipes crown will be at a minimum depth of 0.6 m; with road traffic, the minimum depth is 1 m.

Table: 29 Minimum Trench Width Based on Nominal Diameter of Pipes

(Clause H-2)

S.N.	Nominal Diameter, d_n mm	Minimum Width of Trench, m
1	90 to 250	0.60
2	315	0.85
3	355	1.00
4	400	1.10
5	450	1.15
6	500	1.20
7	630	1.35
8	800	1.65
9	1000	1.80
10	1200	2.00

Table: 30, Minimum Trench Width Based on Depth of Trench

(Clause H-2)

	Depth of Trench	Minimum Width of Trench
1	$h < 1.00$	0.60
2	$1.00 \leq h < 1.75$	0.80
3	$1.75 \leq h < 4.00$	0.90
4	$h \geq 4.00$	1.00

Table:31 Maximum Particle Size

(Clause H-3)

S.N.	Nominal Diameter	Maximum Particle
1	$d_n < 100$	15
2	$100 \leq d_n < 300$	20
3	$300 \leq d_n < 600$	30
4	$d_n > 600$	40

H-3 BEDDING AND FILLING THE TRENCH

Pipes should be installed following the guidelines given below:

a) Before placing the pipe, a sand bed should be prepared (a fine granular material may be used instead of sand) with a thickness from 10 cm to 15 cm. The pipe should be well aligned and levelled.

b) The pipe shall lie on the sand bed. It shall be ensured that all the lower part of the pipe is settled on the sand bed trying to soak as much as possible in order to make the angle of sand that supports the kidneys of the pipe as big as possible.

c) Once the pipe is placed, chamberlain sides shall be filled with the selected material and compacted to achieve >95 percent Proctor normal (P. N.).

d) The trench shall be filled with the selected material and compacted laterally until the upper part of the pipe is buried at least 30 cm.

e) Steps (a) and (d) can be done with the same natural material obtained from the excavation, trying to avoid rocks and large stones, and checking that this natural material can support the forces produced by the pressure inside of the pipe.

Natural soil can be used as the selected filler material whenever it fulfils the following criteria:

1) The filler material should not consist of angular stones or similar material.
2) Filler material should not contain bigger particles than the ones shown in Table 31.
3) Filler material should not contain blocks of soil twice the size of the maximum dimensions of the particles given in the Table 31.
4) From 30 cm above the pipe until the surface of the ground, the trench can be filled with natural material not specifically selected and compacting directly over the whole surface of the trench.

The typical section showing various stages of bedding and filling the trench is shown in Fig. 6.

H-4 ASSEMBLY

a) Remove the protection caps (if any).

b) Verify that the pipe is clean and in good condition. Paying attention to the sockets and spigot ends.

c) Check that the chamfer is correct and free of cracks.

d) Verify that the seal is in its place, clean and free of foreign materials (stones, sand etc.).

e) Lubricate the chamfer of the spigot and the seal with joint lubricant.

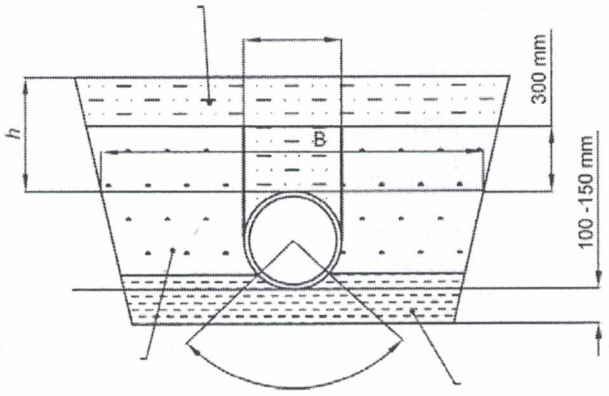
f) Line up the pipe as much as possible horizontal and vertically.

g) Insert only the chamfer edge of the socket, just to support the pipe but leaving the socket lip free.

h) In the case of pipes with nominal diameter $d_n \leq 250$ mm, a firm and dry push should be given to seize the momentum produced by the free movement in the lip of the socket and introduce it until the mark is hidden into the socket.

i) When installing diameters >250 mm, one should use mechanical means to introduce the pipe using materials such as wood, hoists, tackles or slings.

Natural, Tightly-Packed Filling 100 % P.N d_n



Selected Tightly-Packed Filling >95 %
Granular Tightly Packed Material > 95 % P.N.

2 α

Fig: 6 Typical section of Bedding and filling the Trench

नेपाल गुणस्तर परिषद्
Nepal Council for Standardization (NCS)

ने.गुण.५९६:२०७९ Oriented Unplasticized Polyvinyl Chloride (PVC-O) Pipes for Water Supply - Specification

अध्यक्ष : माननीय श्री दिलेन्द्रप्रसाद बडू, मन्त्री, उद्योग,वाणिज्य तथा आपूर्ति मन्त्रालय

उपाध्यक्ष : श्री अर्जुन प्रसाद पोखरेल, सचिव, उद्योग,वाणिज्य तथा आपूर्ति मन्त्रालय

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१.	श्री चन्द्रकला पौडेल	सह सचिव	उद्योग,वाणिज्य तथा आपूर्ति मन्त्रालय
२.	डा. नारायण प्रसाद रेग्मी	सह सचिव	उद्योग,वाणिज्य तथा आपूर्ति मन्त्रालय
३.	श्री केशवकुमार शर्मा	सह सचिव	भौतिक पूर्वाधार तथा यातायात मन्त्रालय
४.	श्री शवनम सिवाकोटी अर्याल	सह सचिव	कृषि तथा पशुपन्छी विकास मन्त्रालय
५.	श्री कोशलचन्द्र सुबेदी	सह-प्राध्यापक	कानुन,न्याय तथा संसदीय मामिला मन्त्रालय
६.	श्री इन्दु बिक्रम जोशी	सह सचिव	शिक्षा विज्ञान तथा प्रविधि मन्त्रालय
७.	प्रा.डा. दीपक प्रसाद सुवेदी	प्राध्यापक	काठमाडौं विश्वविद्यालय
८.	डा. अजय कुमार झा	सह-प्राध्यापक	भौतिक शास्त्र, त्रिभुवन विश्वविद्यालय
९.	श्री भरत राज आचार्य	-	नेपाल उद्योग बाणिज्य महासंघ
१०.	श्री दीपक श्रेष्ठ	उपाध्यक्ष	नेपाल चेम्बर अफ कमर्स
११.	श्री ध्रुव बहादुर शाह	-	नेपाली उपभोक्ता संरक्षण महासंघ

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ने.गुण. ५९६:२०७९ Oriented Unplasticized Polyvinyl Chloride (PVC-O) Pipes for Water Supply - Specification विषयक प्राबिधिक समितिका सदस्यहरु

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९.	श्री अनिल शाक्य	निर्देशक	ने. गुण. तथा ना.तौ. विभाग
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११.	श्री भरतराज आचार्य	सभापति	उ.समिति,नेपाल उद्योग वाणिज्य महासंघ
१२.	श्री शरद शर्मा	-	नेपाल प्लाष्टिक उत्पादक संघ
१३.	श्री ईश्वर प्रसाद	ए. मेनेजर	नेपाल वाटर सप्लाइ कोर्पोरेशन
१४.	श्री देवेन्द्र साहू	ए.जी.एम.	पन्चकन्या प्लाष्टिक एंड आइरन ई.
१५.	श्री रविन्द्र झा	निर्देशक	हिलटेक प्लाष्टिक एण्ड पाईप ई.प्रा.लि.
१६.	श्री माधव तिमिल्सिना	अध्यक्ष	उपभोक्ता अधिकार अनुसन्धान मंच
१७.	श्री शुक्रराज अधिकारी	केमिष्ट	ने. गुण. तथा ना.तौ. विभाग
१८.	श्री सुजित कुमार चौधरी	प्रा.स.	ने. गुण. तथा ना.तौ. विभाग

नेपाल गुणस्तर तथा नापतौल बिभाग

बालाजु, काठमाडौं, नेपाल

फोन नं.०१-४३५०४४५, ४३५०४४७, ४३५०७२९, ४३५०८१८, ४३८५७२३

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Email: nbsm@nbsm.gov.np

पो.ब.नं. ९८५

सर्वाधिकार सुरक्षित

Bill of Quantities (BOQ)

Supply and Laying of 150mm dia DI Pipe (Secondary Pipe) at Lalitpur Metropolitan City-02, from Heritage Garden to Kantihitti, Kalika Mandir

IFB No.: KUKL.LTR/NCB-11/083/084

Provisional Sum					
SL. No.	**Item Description**	**Unit**	**Quantity**	**Unit Rate (NPR)**	**Amount (NPR)**
PS.1	Provisional Sump (Not filled by Contractor): Contractor's all Risk Insurance cover for the Works and Contractor's equipment, Insurance cover for Damages to Third Party.	PS	1.00	11,300.00 Eleven thousand three hundred rupees only.	11,300.00 Eleven thousand three hundred rupees only.
PS.2	Provisional Sump (Not filled by Contractor): Insurance cover against Workman's compensation (Employees of Employer, Consultant/s and contractor/s)	PS	1.00	11,300.00 Eleven thousand three hundred rupees only.	11,300.00 Eleven thousand three hundred rupees only.
PS.3	Provisional Sump (Not filled by Contractor): Items not covered by BoQ	PS	1.00	99,440.00 Ninety-nine thousand four hundred forty rupees only.	99,440.00 Ninety-nine thousand four hundred forty rupees only.
	Total provisional sums				1,22,040.00 One lakh twenty-two thousand forty rupees only.

General Works > Supply of Materials						
SL. No.	**Item Description**	**Unit**	**Quantity**	**Bidder's Rate (NPR)**	**Bidder's Rate (in words)**	**Total Amount (NPR)**
1.1	Supply of Pipes and Pipe Fittings: 160mm dia PVC-0 Class 500 Pipe (12.5)	Rm	1,200.00			
1.2	Supply of Pipes and Pipe Fittings: 150mm dia DI Spigot and Socket Pipe with rubber gasket	Rm	104.50			
1.3	Supply of Pipes and Pipe Fittings: 150mm x 150mm dia DI Flanged Equal Tee	Nos	2.00			
1.4	Supply of Pipes and Pipe Fittings: 150mm dia DI Single Flange Tailpiece	Nos	4.00			

General Works > Supply of Materials						
SL. No.	**Item Description**	**Unit**	**Quantity**	**Bidder's Rate (NPR)**	**Bidder's Rate (in words)**	**Total Amount (NPR)**
1.5	Supply of Pipes and Pipe Fittings: 150mm dia PVC-0 Flange Adaptor	Nos	5.00			
1.6	Supply of Pipes and Pipe Fittings: 150mm dia CI Sluice Valve	Nos	2.00			
1.7	Supply of Pipes and Pipe Fittings: 150mm dia DI Mechanical Coupling	Nos	4.00			
1.8	Supply of Pipes and Pipe Fittings:150mm x 100mm dia DI Flanged Reducer	Nos	1.00			
1.9	Supply of Pipes and Pipe Fittings: 100mm dia MS HDPE Flange Adaptor (OD)	Nos	1.00			
1.10	Supply of Pipes and Pipe Fittings: 110mm dia Elcetrofusion Coupler	Nos	1.00			
1.11	Supply of 16mm dia 125mm Long Nut Bolts	Kg	16.00			
1.12	Supply of Rubber Washer	M2	1.00			

Civil Works						
SL. No.	**Item Description**	**Unit**	**Quantity**	**Bidder's Rate (NPR)**	**Bidder's Rate (in words)**	**Total Amount (NPR)**
2.1	Civil Works: Asphalt road surface cutting using pitch cutter including removal of stumps and other deleterious matter as per technical specification and drawing	M2	764.70			
2.2	Civil Works: Dismantling of rigid pavement (PCC) including removal of stumps and other deleterious matter as per technical specification and drawing	M3	2.70			
2.3	Civil Works: Earthwork in excavation in gravel and boulder mixed soil including removal of stumps and other deleterious matter as per technical specification and drawing (60% Using hydraulic excavator and 40% manual excavation)	M3	782.70			

Civil Works						
SL. No.	**Item Description**	**Unit**	**Quantity**	**Bidder's Rate (NPR)**	**Bidder's Rate (in words)**	**Total Amount (NPR)**
2.4	Civil Works: Laying and jointing of 160mm dia PVC-0 (Class 500) Pipe with Socket and Spigot Joint as Per Technical Specification and drawing	Rm	1,200.00			
2.5	Civil Works: Laying and jointing of 150mm dia DI Pipe with Spigot and Socket joint as per technical specification and drawing.	Rm	104.50			
2.6	Installation of Pipes Fittings including cutting, tapering, lubricating: 150mm dia CI Sluice Valve	Nos	2.00			
2.7	Installation of Pipes Fittings including cutting, tapering, lubricating: 150mm dia DI Tee, Flange Adaptor	Nos	8.00			
2.8	Civil Works: Supply and Laying of well graded sand for preparatrion of bedding to lay PVC-0 pipe as per technical specification and drawing	M3	108.00			
2.9	Civil Works (Road Reinstatement): Providing and Paving of brick on flat position for soiling work as per technical specification and drawing	M2	210.00			
2.10	Civil Works (Road Reinstatement): Providing, mixing and spreading of M20 (1:2:4) mix concrete with proper curing as per technical specification and drawing	M3	31.50			
2.11	Civil Works: Backfilling trecnh with proper compaction as per technical specification and drawing	M3	751.20			
2.12	Preliminary and General Work: Provide all physical and financial progress reports with as built drawings of all the compoenents/structures of the project showing newly constructed works such as pipelines, interconnection work with valves, fittings etc in a format suitable for autodesk format at the completion of eacxh section with photograps	Nos.	1.00			

Civil Works						
SL. No.	**Item Description**	**Unit**	**Quantity**	**Bidder's Rate (NPR)**	**Bidder's Rate (in words)**	**Total Amount (NPR)**
2.13	Preliminary and General Work: Provide safety equipment for the Project Manager/Engineer/Employer's representative at the each site offices of the types and number specified for the period of the contract. (Each Set consist of 1 pair shoes, 1 no Jacket and 1 no Helmet).	Set	1.00			

Total Item Price	
VAT (13.00%)	
Grand Total	