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DESIGN BASIS REPORT

FOR

Project Rochem Vasai Expansion

FOR PROPOSED FACTORY BUILDING AND ALLIED WORKS

AT

Village Bilalpada, S.no 42/1, Plot no. 49,50,51,52., S.no 55 (part) Tal. Vasai, District Palghar.

FOR

Rochem Separation Systems India Private Limited


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1 INTRODUCTION

Project Rochem Vasai Expansion is a brownfield project to expand the manufacturing facilities, storage and supporting activities like design, administration, quality controls & assurance, staff welfare and utility section to support the plant productivities.

This document briefs the **Design Bases** of proposed facilities that covers functional and operational assumptions. The document also briefs the **Basic Engineering and Deliverables**.


The basic idea of the document is to define the design philosophy, to proceed for detail engineering and to get the budgetary cost of the project.

We confirm that we have, where required, obtained requisite consent that may be required from any governmental authority or other person, in relation to the information used by us or provided in this project report and material.

We further confirm that we are not related to the Company and any of its Promoters, Directors and Promoter Group members.

Name of the Company requesting assessment	Rochem Separation Systems India Private Limited
Purpose of the assessment	To prepare a design basis report for expansion of the existing manufacturing facility of Rochem Separation Systems India Private Limited situated at Village Bilalpada, S.no. 42/1, Plot no. 49,50,51,52., S.no 55 (part) Tal. Vasai, District Palghar
Date of assessment and validity	The assessment has been carried out from 1 st July 2024 and completed on 5 th December 2024. The design basis report is valid for a period of two years subject to no change in the underlying rules and regulations of the local corporation with respect to construction of the building
Registered office	The registered office of Rochem Separation Systems India Private Limited is 101 HDIL Towers, Anant Kanekar Marg, Bandra East, Mumbai 400051, India
Particulars of the project	The project envisages construction of a new factory within the existing factory premises connecting five plots of the company
Project Site	Village Bilalpada, S.no 42/1, Plot no. 49,50,51,52., S.no 55 (part) Tal. Vasai, District Palghar.
	Google location: https://maps.app.goo.gl/54dk5vUx2o41Shk9l



	 <p style="text-align: center;"> Total land in sq. m. Utilized land in sq. m. for main building Remaining land to be utilized in sq. m. for open area </p> <p style="text-align: center;"> 4127 2787 1340 </p>
Project cost and duration	The project cost is estimated to be Indian Rupees 105.00 Million and the estimated construction period is 24 months.
Present status	There are three existing buildings on the plots mentioned above. Two of the building would be demolished for the construction.
Benefits expected from the facility	The new facility to provide a company an integrated manufacturing facility for its entire production requirement which is currently being carried out in different collocated units reducing the production time and material handling for each project executed by the company.
Size of the plant	Point 2.1 (Facility Design) under Executive Summary details on the size of the plant.
products to be manufactured	Pre-treatment: Effluent Treatment plant (ETP), Ultra-filtration (UF) RO: Reverse Osmosis Plants, Ultra-High Pressure Reverse Osmosis (UHPRO), Nano-filtration Plant, Waste Heat Evaporators (WHE)

1.1 SET-UP OF THE DOCUMENT

The basic detail engineering has been grouped as follows:

Basic considerations	Starting points, underlying philosophy
Functional requirements	What the facility must provide
Operational requirements	How the facility shall be designed and operated
Design philosophy	Guideline of the design



Costing and scheduling	Primary budget and schedule
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2 EXECUTIVE SUMMARY

2.1 FACILITY DESIGN: It consists of following

- a) Building having height of 5m from plinth level which will be 600mm from made up ground level.
- b) Proposed construction at this stage is old Industrial Building including office space.
- c) Building with air-conditioned Office of 720.90 Sq.m. (7760 Sq.ft) on Mezzanine and Storage facilities 371.60 Sq.m. (4000 Sq.ft) below office on ground floor. Also, it will have 349.30 Sq.m. (3760 Sq.ft) air conditioned production area.
- d) Underground water tank of 20kl capacity (Fresh water 15kl and Grey water 5kl).
- e) Overhead water tank.
- f) Sewage collection pit.
- g) Fire water tank.
- h) Waste water tank (2 nos, Domestic waste and Process waste).
- i) Recycled water tank.
- j) Process solid waste area 5 T bin at one location.
- k) Rainwater Harvesting System.

2.2 FACILITY CRITERIA

- a) Approximate 40% of plot area is proposed for development which includes building. Facility shall comply with local statutory rules and regulations.

2.3 FACILITY FUNCTIONS

- a) Administration and workers amenities.
- b) Production
- c) Quality control and QA facility.
- d) ETP
- e) Water storage and recycling
- f) Warehousing
- g) Fire hydrant system

2.4 FACILITY LOCATION

The site is located at Village Bilalpada, S.no. 42/1, Plot no. 49,50,51,52., S.no 55 (part) Tal. Vasai, District Palghar. The land is owned by the Company and is a non-agricultural land,



2.5 Approvals

The status of approvals is as follows:

Sr. No.	Approval	Authority	Status
Pre-construction			
1.	Physical & Level Survey	Private	
2.	7/12 Extract	Talathi (Revenue Department)	
3.	Gutbook Map	Taluka Inspector of Land Record (TILR)	
4.	Government plot measurement	TILR	
5.	Plot Demarcation	Private	
6.	Preparation of Architectural Drawing	Architect (Private)	
7.	First Application for submission of proposal.	Vasai Virar City Municipal Corporation (VVCMC) (online)	Filed on 25/11/2024
8.	Undertaking of various affidavit regarding Approval of project from municipal corporation.	VVCMC	
9.	Application for Commencement Certificate.	VVCMC	
10.	Provisional Tree N.O.C	VVCMC	
11.	Provisional Fire N.O.C	VVCMC	
12.	Provisional Rainwater Harvesting NOC	VVCMC Panel Rainwater harvesting agency.	
13.	NOC of Society	Vasai Taluka Industrial co-op estate Ltd	
14.	Verification of Land Title search from 1952 till date.	Advocate.	
15.	Site Preparation and clearance	Owner	
Post construction			
1	Final Tree N.O.C	VVCMC	
2	Final Fire N.O.C	VVCMC	
3	Final Rainwater Harvesting N.O.C	VVCMC Panel Rainwater harvesting agency.	
4	Lift NOC	Public Works Department (PWD)	
5	Organic Waste Converter	VVCMC panel agency	
6	Plumbing and Drainage completion certificate	VVCMC panel agency	
7	Grey Water Treatment Plan	VVCMC panel agency	
8	Sanad	Revenue Department	
9	Occupancy Certificate	VVCMC	



3 PROJECT ESTIMATED COST

Sr. No.	Description	Area	Unit	Area	Unit	Construction rate (Rs.)	Total Cost (Rs.)
1	Building with mezzanine	2,787.07	Sq.m	30,000.00	Sq.ft	₹2,600.00	₹78,000,000.00
2	Water tank	20,000.00	Lit.	20,000.00	lit.	₹90.00	₹1,800,000.00
3	Pavement works	2,475.84	Sq.m	26,650.00	Sq.ft	₹330.00	₹8,794,500.00
4	Compound infrastructure works	365.00	Sq.m	3,928.86	Sq.ft	₹600.00	₹2,357,316.00
5	MEP cost incl. overhead cranes, firefighting, internals, etc.	1.00	no.	1.00	no.	₹9,500,000.00	₹9,500,000.00
6	Electrical works	1.00	no.	1.00	no.	₹4,600,000.00	₹4,600,000.00
Total Project Cost							₹105,051,816.00

4 PROJECT COMPLETION PERIOD

The expected schedule of implementation of the Vasai Project is set forth below:

Particulars	Expected date of commencement	Expected date of completion
Approval for construction plan at existing location	Applied*	April 2025
Construction completion	May 2025	April 2026
Occupation certificate	April 2026	June 2026
Commencement of production	July 2026	-

Note: The schedule of implementation for Vasai Project is based on the Vasai Project Report.

* Applied to the deputy director, town planning, VVCMC, Virar vide application dated November 25, 2024. Schedule of Deployment of Funds:

Particulars	Total amount to be funded from Net Proceeds	Amount already deployed as on [December 05, 2024]	Estimated amount to be deployed from the Net Proceeds in		
			Financial Year 2025	Financial Year 2026	Financial Year 2027
Construction of Assembly Unit	₹105.05 Million	Nil	₹1.00 Million	₹52.00 Million	₹52.05 Million

5 Electrical details:

Sl. No.	Description	Qty	Unit
I	METER BOX Supply, installation, testing & commissioning of dust & vermin proof wall mounted cubicle type Metering Board fabricated out of 16 SWG CRS & powder coated with CT Metre provision including supply & installation of 100 A HRC Fuse with suitable Fuse-3 nos. and Nuetral link, 125 A TPN isolator -1 no. Panel should confirm to the KSEB & Electrical Inspectorate Standards.	1	No.
II	VERTICAL POWER DB Supply, erection, testing and commissioning of 8 way TPN Vertical MCB DB. Made out of 16SWG CRCA Sheet, dust and vermin proof, wall mounting consisting of the following: Incomer : 63A (100 MA) 4 Pole MCB DB - 1No. Outgoing : 40 A 3Pole MCB - 1 No for LDB Outgoing : 32A SP MCB - 2 Nos for UPS Outgoing : 32A SPMCB - 4 Nos Outgoing : 20A SPMCB - 4 Nos Outgoing : 16A SPMCB - 4 Nos Outgoing : 10A ASP MCB - 2 Nos	1	Set
III	DISTRIBUTION BOARD for Lighting		
1	Supply, installation, testing & commissioning of wall mounted type Double door dust & vermin proof 4 Way TPN MCB DB concealed on wall comprising the following: 4 pole 40A, (30 MA) ELCB as incomer -1 no 6A- 10 A MCB- 12 nos. as outgoing for lighting	1	Set
2	Supply & installation of 40 A 4 pole MCB Change Over Switch with center offing metal enclose for lighting circuit		
IV	DISTRIBUTION BOARD for UPS		
1	Supply & installation of 40 A2 pole MCB with enclose for UPS input supply.	2	No
2	Supply, erection, testing & commissioning of wall mounted type Double door dust & vermine proof 12 Way SPN MCB DB concealed on wall comprising the following: 2 pole 40 A MCB isolator- 1 no as incomer 6/10 A MCB -12 Nos as outgoing to distribute UPS power supply	2	Set
V	CABLE LAYING AND TERMINATION		
1	Supply, laying & dressing of 1.1 KV grade PVC insulated armored cable with Aluminum conductor along with 2 layer 10 SWG Cu. conductor concealed or on wall/ ceiling/ trench/cable rack with clamps etc. including back filling of trenches if necessary. 3.5 core 50 sq.mm from Meter box to VDB	45	Mtr

Sl. No.	Description	Qty	Unit
2	4 core 10 sq.mm (from VDB to LDB)	25	Mtr
2	4 core 10 sq.mm (from VDB to ATM)	40	Mtr
VI	End termination of above cables using flange type cable glance and heavy duty tinned AL. crimping type cable sockets including cable earthing.		
1	50 sq.mm gland	2	No
2	10 sq.mm gland	2	No
VII	EARTHING		
1	Supply, installation, testing & commissioning of 600 X 600 X 3 mm Cu. Plate buried in ground at a depth of 3 mtr. With alternate layers of charcoal & salt including supplying & fixing of 20 mm dia. 3 mtr. Long perforated pipe with funnel for watering , construction of inspection chamber by masonry work to accommodate 460 x 460 mm Cl. heavy duty hinged cover etc. as per IS:3043 and including all civil work for 2 nos. UPS.	2	No
2	Supply & providing ISI pipe earthing as per IS : 3043 with 3 mtr. long 40 mm dia B' class GI pipe providing GI funnel with wire mesh on top providing GI clamp on top of GI pipe test joint, filling around the GI pipe at a radius of 15 cm with homogeneous mixture of charcoal, common salt & river sand up to a Ht. of 2.5 mtr. from the bottom and rest of the portion with excavated soil, providing brick work masonries, plastering, fixing cast iron covering etc. complete for KSEB main panel.	2	No
VIII	Supply & laying following Cu. Strips/wires		
1	No. 10 SWG Cu. wire from KSEB main panel to earth pit.	25	Mtr
2	16 sq.mm Cu. Wire through 20 mm rigid PVC conduit for UPS earthing.	25	Mtr
3	30 cm long Earth bunch of 25 x 3 mm Cu. Suitable bented into shape with necessary holes for termination for UPS DB, LDB & VDB.	3	No
4	Supply and laying of 3 runs of 10 sq.mm PVC Cu. Wire through 20mm PVC pipe fo taking supply for 10 KVA Three phase generator.	30	Mtr
1X	WIRING FOR LIGHT, FAN, PLUG, SOCKETS etc.		



Sl. No.	Description	Qty	Unit
	Supply all materials & wiring recess/surface through wall, floor, ceiling etc. as per color code with 1.5 sq. mm PVC insulated FRLS stranded Cu. wire for the points & 1.5 sq.mm PVC insulated green colour stranded. Cu. Wire as continuous Earth for points with independent Earth wire for each circuit through ISI grade 20/25 mm PVC conduit including all accessories as per IS : 9537 part II including circuit wiring using 2.5 sq.mm Pvc insulated stranded Cu . wire for phase neutral & Earth with all materials & installation of factory made MS boxes, 2 plate model modular switches & 3 plate ceiling rose/connectors / angle holders etc. of approved make for electrical fixtures.No of cables in conduit should be limited to the IS standards & as per the conditions laid down in the Tender. Check nuts to be provided in the conduits in switch boxes, DB etc. The rate includes circuit wiring & no cost is allowed for additional length of circuit wiring (Wire make Phenolex/RR/Wipro Suraksha)		
1	1 light controlled by 1 switch	25	No
2	2 lights controlled by 1 switch	10	No
3	Supply all material & wiring same as above but for 6 A 5 pin plug points with 6 A switch in separate location with indicator using 3 run 1.5 sq.mm 1.1 KV grade PVC insulated Cu. Stranded wire as per colour code for phase, neutral & Earth. (independant in position)	10	No
4	Same as above but for 6 A 5 pin plug points in switch boxes.(combination in position)	15	No
5	Same as above but for Ceiling fan points including supply & installation of electronic fan regulator 250 watts of approved make in suitable MS box	3	No
6	Same as above but for Wall fan / Exhaust fan points including supply & installation including all necessary fittings of approved make in suitable MS box	4	No
7	Supply, wiring and installation of Calling bell in manager's cabin using 1.5 sq.mm PVC Cu. Wire through 20 mm PVC pipe with modular bell push	1	No
8	Wiring for UPS light point using 3 runs of 2.5 sq.mm PVC Cu. wire through 20 mm PVC pipe	8	No
9	Supply all materials & wiring recessed/surface through wall, floor, ceiling etc. as per colour code with 3 runs of 1.1 KV grade 2.5 sq. mm PVC insulated Cu. Wire for phase neutral and green colour for Earth through ISI marked 20 mm PVC conduits with all accessories and supply & installation of modular 6/16A plug with switch for Power points . The rate should be quoted considering the average length required for wiring from DB & no claim for additional length.	5	No



Sl. No.	Description	Qty	Unit
10	Supply all materials & wiring as per colour code with 2 runs of 1.1 KV grade 4 sq.mm PVC insulated Cu. wire for phase neutral and 2.5 sq.mm green colour for Earth through ISI marked 20 mm PVC conduits with all accessories & supply & installation of modular type 20A metal clad plug & socket for AC units (Ref: Electrical layout) . The rate should be quoted considering the average length required for wiring from DB & no claim for additional length.	5	No
11	Supply all materials & wiring recessed/surface through wall, floor, ceiling etc. as per color code with 2 runs of 1.1 KV grade 6 sq. mm PVC insulated Cu. wire for phase neutral and 4 sq.mm green color for Earth through ISI marked 20 mm PVC conduits with all accessories for UPS input/output supply.	45	Mtr
12	Supply all materials & wiring recessed/surface through wall, floor, ceiling etc. as per colour code with 3 runs of 2.5 sq. mm PVC insulated Cu. wire PVC conduits with all accessories for Board light supply.	40	Mtr
X	WIRING FOR COMPUTER WORK STATIONS		
	Supply all materials & wiring through recessed/surface through wall, floor, ceiling etc. as per colour code with 3 runs of 2.5 sq. mm PVC insulated stranded Cu. Wire for phase neutral and green colour for Earth through ISI marked 20 mm PVC conduits from DB for Computer Workstation, including supply & installation of 3 nos. 6A 3 pin plug & socket with 3 nos. switches in metal boxes including chipping the floor, plastering etc. if necessary.	18	No
XI	INSTALLATION OF ELECTRICAL FIXTURES		
	Installation, giving electrical connection, testing & commissioning of the following light, fan etc. fittings including the cost of materials for fitting, connection, using flexible wires through 20 mm flexible PVC conduit including the cost of chain, down rods if needed etc. according to the requirement all fittings should be of approved make & model as per the material list attached.		
1	WIPRO -Immaculate LED Surface mounted CRCO 10/SO38/HP 57	20	No
2	Wipro Surface Mounted LD 81/171/XXX/60 Down Light	11	No
3	Wipro Garnet12W LED Bulb (Cool Day light)	4	No
4	1200 mm Ceiling fan with electronic regulator and all other accessories of approved make	5	No
5	450 mm wall mounted fan with all accessories.	1	No
6	300 mm exhaust fan of approved make with all accessories.	3	No
XII	TELEPHONE POINTS		

Sl. No.	Description	Qty	Unit
	Supply of all materials wiring recessed/Surface through wall ,Floor ,Ceiling ,Partitions etc using 4 pair .5mm telephone cables in 20mm PVC conduit from the exchange concealed wall, floor partitions etc including the cost of modular 2 plate type Telephone Jack RJ11 mounted in metal boxes ,one separate cable for each point. Number of cables in one conduits limited to three. The rate is for average length and no cost is allowed for additional Length	10	Nos
XIII	NETWORKING		
1	Supply & laying of Cat 6 - 4 pair UTP cable	350	Mtr
2	Supply & laying of 20mm casing capping / 25mm / Pvc conduit for laying UTP cable.	90	Mtr
3	Supply & termination, fixing of Cat 6 information outlet (I/O single) with back box & phase plate.	18	No
4	1 mtr (3 ft) length patch cord - Cat 6	18	No
5	2 mtr (7') length patch cord - Cat 6	18	No
6	Supply & erection of Cat 6 -16 port patch (jack) panel with IO loaded.	1	No
7	Supply & fixing of 16 port 10/100 Mbps fast Ethernet switch (unmanaged).	1	No
8	Wall mounting type 19" - 9U rack (HCL/ Exlan) with acrylic door with 16 port patch (Jack) panel & its termination with following accessories: a. Power Manager - 2 No with 6 sockets b. Cable Manger - 2 No, c. Canti Lever tray - 1 No d. Hard ware Kit - 2 packet of 10 nos		
9	Supply & fixing of 16 port 10/100 Mbps fast Ethernet switch (unmanaged).Cat 6-16 port patch (Jack) port and its Termination	1	No
10	Supply and installation of KRONE connector telephone junction box of 20 pair.	1	Job
Total Lumpsum Cost		46,00,000/-	



6 Fire fighting system details:

Sl. no.	Fire fighting Installation	Requirements	Provison	Remarks
1	PORTABLE FIRE EXTINGUISHER	Required at Prominent places	IS : 2190 & IS : 15683	Required in every floor, lift machine room, Electric meter room, pump room & also at the prominent places
2	HOSE REEL HOSE	Required at Prominent places	in all staircase	On each floor in the staircase landing for fire fighting. The first aid hose reel shall be connected directly to riser / down comer main and diameter of the hose reel shall not be less than 19mm confirming to IS 884:1985
3	YARD HYDRANT / RING HYDRANT AROUND THE BUILDING	Required	At Various strategic Location	Fire Brigade inlet connection should be provided. Hydrant points should be provided with 2 nos. of Delivery hose confirming to IS-14933-2001 along with standard branch (Universal) confirming to IS 2871. The distance between 2 hydrants should not be more than 45 mtrs. The guidelines should be followed as per IS 3844:1989.
4	WET RISER	Required	in all staircase	Required to provide in the staircase and fire escape staircase. Landing of valve should be installed confirming to IS:5290 (Zenith / Jindal / Tata)
5	MANUALLY OPERATED ELECTRIC FIRE ALARM SYSTEM	Required for the building	At Various strategic Location	Manually operated Fire Alarm should be provided, it should be connected to alternate power supply

6	UNDER GROUND WATER TANK	Required at 1,00,000 litres.	This water shall be used exclusively for Fire fighting
7	OVERHEAD WATER STORAGE TANK	Required 25,000 litres capacity.	Tank of 25,000 litres capacity shall be provided in appropriate places at the terrace level. The design and layout shall be got approved from H.E's department prior to erection. The tank shall be connected to the wet riser through a booster pump through non-return valve and open gate.
8	FIRE PUMP BOOSTER PUMP, SPRINKLER PUMP AND JOCKEY PUMP	<ul style="list-style-type: none"> i. Wet riser shall be connected to a fire pump at ground level of 2280 litres/min capacity giving the pressure of not less than 3.2 kgs/sq.cms. At the topmost hydrant along with a jockey pump of suitable size. ii. Booster pump (Kirloskar / Crompton / Grandfos) of capacity of 900 litres / min having a pressure of not less than 3.2 kgs/sq.cms at the hydrant outlet of the wet riser-cum-down comer shall be provided at the terrace level of the building. iii. An independent sprinkler pump of same capacity of main pump along with jockey pump shall be provided for automatic sprinkler. iv. Control panel / operating switches shall be located on ground floor. v. Electric supply (normal) to these pumps shall be on independent circuit. vi. One standby pump of same capacity fire pump. vii. Installation of negative section arrangement and submersible pump shall not be allowed. viii. Fire pumps shall be provided with soft starter on variable frequency drive starter. 	
9	FIRE BRIGADE CONNECTION FOR STATIC WATERTANK AND FOR HYDRANT SYSTEM	Required at the main gate.	
10	SIGN INDICATORS	Required at prominent places	Sign indicators should be provided at prominent places

11	ALL FIRE SAFETY, SAFE EVACUATION OF OCCUPANTS IN CASE OF EMERGENCY SIGNS	Required at prominent places	As per guidelines given in IS:9457 for safety colour and Safety IS:12349 for fire protection safety signs IS:12407 for Graphics Symbols for fire protection plan.
12	AUTOMATIC SMOKE DETECTION	Require in electric meter room, common corridor passage and each floor level and lift machine room and prominent places of building.	Automatic smoke detection system with main console panel at ground floor level shall be provided in electric meter room, common corridor passage and each floor level and lift machine room as per standard laid down by T.A.C or relevant I.S Specification.
13	AUTOMATIC SPRINKLER SYSTEM	Required at lift lobby and common corridor passage and at each floor level and prominent places of building	Automatic sprinkler system shall be provided in lift, lobby and common corridor passage and at each floor level. The Automatic sprinkler system shall be installed as per standard laid down by T.A.C or relevant I.S Specification.
14	MANUAL CALL POINT	Required	Manual call point should be provided at prominent places.

ALTERNATE SOURCE OF POWER SUPPLY:-

An alternate source of LV/HV supply from a separate substation or from a diesel generator with appropriate changeover switch shall be provided for fire pumps, booster pump, sprinkler pump, jockey pump, staircase and corridor lighting circuits and fire alarm system, detection system, public address system, voice evacuation system etc. if any and it shall be housed in separate cabin.

ENTRANCE DOORS:-

Each entrance doors shall be of solid core having fire resistance of not less than half an hour (Solid Wood of 45mm. thicknesses).

CANTEEN AREA (LPG STORAGE):-

- i. If L.P.G. is used for cooking purpose in canteen the L.P.G. pipelines & fittings & accessories used shall be strictly conforming to IS:6044 Part-I. The L.P.G pipeline & related installation shall be done by reputed and authorized agency. The agency shall issue a certificate that the work is carried out as per IS: 6044 Part-I.
- ii. The L.P.G. storage area shall be provided with a separate shed painted in RED Color, "Danger" "No-Smoking" signs shall be painted on the door of L.P.G. shed shall be kept with responsible person of the company.
- iii. Minimum Two Exits should be provided diagonally opposite shall be provided to approach first floor of the canteen building .
- iv. 4 Nos. of DCP Fire Extinguishers of 10Kgs each should be provided near LPG Battery.

GUIDELINES FOR RAW MATERIAL STORE/ GODOWN:-

- i. The storage in godown should be in systematic way proper roads should be marked by "Yellow" color & should be kept free of obstruction all the time.
- ii. The maximum stacking height should be marked on the walls in RED color. The stacking height should not be more than the red line. Red line should be marked on 1.5mtrs from lowest roof level.
- iii. All electrical fitting, fixtures should be flameproof & confirming to relevant IS all electrical wiring, fitting & fixtures should be above the red line (Stacking limit line).
- iv. The indication mark like Exits, Fire Escape, etc. should be prominently marked with florescent paint so that it can be seen in darkness.

TRANSFORMERS:-

- i. Transformers shall not be installed on upper floors.
- ii. The switchgears shall be housed in a separate room separated from the transformer bay by a fire-resisting wall with fire resistance of not less than four hours.
- iii. The transformers shall be protected by providing proper fire Protection
- iv. A tank of RCC construction of capacity capable of accommodation entire oil from the transformers shall be provided at lower level, to collect the oil from the catch pit to the tank shall be of non-combustible construction and shall be provided with a flame-arrestor.
- v. No grass or shrubs shall be allowed to grow in transformer switchyard.
- vi. A barbed wired fencing of minimum 1.5 mtr., height shall be provided around transformer switchyard & the gate shall be provided for entrance. They should always locked & the keys should be kept all authorized/responsible person of the company.

ELECTRICAL SERVICES:-

- i. All cables used shall be F.R.L.S (Fire Retardant low Smoke).
- ii. The electric distribution cables/wiring shall be laid separate duct. The duct shall be sealed at every alternate floor with non-combustible materials having same fire resistance as that of the duct.
- iii. Water mains, telephone lines, intercom lines, gas or any other service lines shall not be laid in the duct of electric cables.
- iv. Separate circuits for water pumps, Lifts, Staircase and corridor lighting shall be provided directly from the main switch gear panel and these circuits shall be laid in separate conduit pipes so that fire in one circuit will not affect the others.
- v. The inspection panel doors and any other opening in the shaft shall be provided with airtight fire doors having the fire resistance of not less than two hours.
- vi. Medium & low voltage wiring running in shaft and within fall ceiling shall run in metal conduit.
- vii. An independent & well-ventilated service room shall be provided on the ground floor with direct access from outside or from the corridor for the purpose of termination of electric supply. The doors provided for the service room shall have fire resistance of not less than two hours.

STAIRCASE AND CORRIDOR LIGHTINGS :-

- i. The staircase and corridor lighting shall be on separate service and shall be independently connected so as it could be operated by one switch installation on the ground floor easily accessible for firefighting staff at any time irrespective of the position of the individual control of the light points. if any.



- ii. Staircase and corridor lighting shall also be connected to alternate source of supply.
- iii. Suitable arrangements shall be made by installing double throw switches to ensure that the lighting installed in the staircase and the corridor do not get connected to the sources of supply simultaneously. Double throw switch shall be installed in the service room for terminating the standby supply.
- iv. Emergency lights shall be provided in the staircase/corridor.
- v. Passageway should be provided as per the guidelines given in National Building Code-2016.

STAIRCASE DESIGN REQUIREMENT:-

- i. The minimum headroom in a passage under the landing of a staircase shall be 2.2 Mtrs.
- ii. The main and external staircases shall be continuous from ground floor to the terrace level.
- iii. No electrical shafts, AC ducts or gas pipe etc. shall pass through or open in the staircase,
- iv. Lifts shall not open in staircases.

RECOMMENDATIONS FOR FIRE FIGHTING SYSTEM:-

- i. GI-C-Class pipe IS:1239 with welding of GI Elbows fittings, flanges & pipe whichever necessary & painting of enamel primer with 2 coats of post office red PAINT(Riser)
- ii. Fire hydrant valve IS-5290 marked , with complete accessories on each floor. (Including ground floor)
- iii. Good quality MS swinging type hose reel drum with hose reel hose (Thermoplastic, as per IS:12585 -1988) of 10kg/cm² working pressure with diffuser nozzle & gate/ ball valve on each floor.
- iv. 4. GM air release valve of 25/20mm dia.
- v. Sluice Valve / Butterfly Valve / NRV / Ball Valve/ Y-Strainer / Foot Valve of ISI mark.
- vi. MS hose box of 18-gauge thickness, front glass 15mtrs Rein forced Rubber lined Fire Hose IS-636: 1988 Type A of ISI marked delivery hose pipe ISI – 903 marked coupling & SS branch pipe ISI Mark.
- vii. ISI marked mono block booster pump/ Centrifugal main/Sprinkler /Jockey/ Stand by pumps with proper shelter with start-up switch on ground or terrace.
- viii. SS metal male 2-way adaptor FIRE BRIDAGE breaching (with NRV & Drain plug) 1 set at ground level.
- ix. Reputed make with relevant standard for gong valve, Flow Switch, Sprinklers, Orifice plate, FRLs Cables, Detectors of all types, Alarm panels, Talkback system, MCP cum Hooters, all types of required Fire Extinguishers, Main control Centre Panel (MCC), Air Vessel, Vibration Pads etc. complete to have running and efficient system.

GENERAL CONDITIONS:-

- i. All material required to be used for protection must be of BIS mark.
- ii. The entire fire protection system must be painted in red color.
- iii. First aid box should be provided at society office security cabin.
- iv. The other provisions of D.C. Rules of V.V.C.M.C., U.D.C.P.R-2020, N.B.C. part IV, 2016 & Maharashtra Fire 'Prevention & Life Safety Measures (Amendment) Act - 2023. Should be strictly followed.
- v. Fire Escape Balcony must open on every floor & protected with suitable railings.
- vi. The schematic drawings / plans, BOQ with specifications of firefighting systems i.e. wet



riser, sprinkler system, fire alarm system etc. shall got approved from CFO prior to installation.

- vii. The test certificates of fire pumps/ booster pumps/ sprinkler pumps/ jockey pumps from the manufacture of the pumps submitted while applying Final NOC from this department.

7 BUILDING DESIGN DBR: As mentioned below.



PROPOSED FACTORY BUILDINGS AND ALLIED WORKS

AT

**Village Bilalpada, S.no. 42/1, Plot no. 49,50,51,52., S. no. 55 (part) Tal. Vasai, District
Palghar.**

FOR

M/S. Rochem Separation Systems Pvt. Ltd

8 STRUCTURAL DESIGN NOTE

9

CIVIL DESIGN CRITERIA



INTRODUCTION

M/S. Rochem Separation Systems Pvt. Ltd. proposed construction of industrial building including office space and allied works as well as pavement and allied infra works at Village Bilalpada, S.no. 42/1, Plot no. 49, 50, 51, 52, Tal. Vasai, District Palghar .

SCOPE

This document describes the general requirements and various design parameters that are to be considered in the design of buildings/structures and other services/utilities for proposed work.

UNITS OF MEASUREMENT

The units of measurement adopted in design shall be the SI system of units.

Opening

The proposed structure is a Greenfield industrial building project. The proposed building consist of reinforced concrete (RC), ground + 2 floors (i.e. 3 nos. of slabs) frame structure.

In this brief report we are presenting the data and assumptions related to the structural design of the project, which has led to the conceptual design at this preliminary stage. The document attempts to record all inputs assumed in design and will form the basis for all future detailed structural work. The report most importantly clarifies the load criteria assumed in the design and it is therefore expected that all related consultants, including the architects, would go through the document and refer to it at every stage of detailed design. Recommendations or revisions on assumed parameters are requested at this stage.

Besides this the report will also form the outline of the design criteria and methods of both analysis and design to be adopted in this project with the aim of achieving a design that satisfies all sorts of seismic, and serviceability and longevity requirements.

Design Standards and codes of practice

Note: All the used standards shall be of latest edition

IS Code	Description
IS 18299 : 2023	Structural Design and Proof Checking Consultancy Services for Structures - Requirements
ISO 16204 : 2012	Durability - service life design of concrete structures
IS 456 : 2000	Plain And Reinforced Concrete-Code Of Practice
SP 16 : 1980	Design aids for Reinforced concrete to IS 456-1978.
SP 34 : 1987	Handbook on Concrete Reinforcement and Detailing

IS 875	Code Of Practice For Design Loads For Buildings And Structures
IS 875-1 : 1987	Dead Loads- Unit Weights Of Building Material And Stored Material
IS 875-2 : 1987	Imposed Loads
IS 875-3 : 2015	Wind Loads
IS 875-5 : 2015	Special Loads And Combinations (Other Than Earthquake)
IS 1904 : 1986	Code Of Practice For Design & Construction Of Foundations In Soils
IS 1080 : 1985	Code of practice for design & construction of Shallow foundations in soils.
IS 12070-1987	Code of practice for design & construction of Shallow foundations on rocks.
IS 2720	Method of test of soils
IS 2131-1981	Method of standard penetration test of soil
IS 6403-1981	Code of practice for determination of bearing capacity of shallow foundation
IS 3025-11,24,32	Method of sampling and test for water
IS 9143	Method for determination of unconfirmed compressive strength of rock
IS 8764	Method of determination of point load strength index of rocks
IS 13030	Method of test for determination of water content, porosity, density property of rock
	Test of soil and water sample for chemical
IS 3764 : 1992	Excavation work - Code for Safety
IS 1893 : 2016	Criteria For Earthquake Resistant Design Of Structures
IS 4326 : 2013	Earthquake Resistant Design And Construction Of Buildings - code of practice
IS 13920 : 2016	Code Of Practice For Ductile Detailing Of Reinforced Concrete Structures Subjected To Seismic Forces
IS 3414 : 1968	Code of practice for design and installation of joints in buildings
IS 3370	Code of practice for concrete structures for the storage of liquids
IS 3370-1 : 2009	General requirements
IS 3370-2 : 2009	Reinforced concrete structures
IS 3370-4 : 1967	Design tables



IS 1786 : 2008	High strength Deform steel bars and wires for concrete reinforcement
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Design Life and its definition

The design life period is provided by IS 875-3.

Class of structure	Design Life
General building and structures	50 years

The expected performance of the structure during its design life is provided by IS 18299.

IS 18299

2.5 Design Service Life — Period considered for which a structure or a part of it is to be used for its intended purpose with periodic inspection and routine maintenance. but without major repair being necessary.

Structural system

The structure shall be designed as RCC ground + 2 floors (i.e. 3 nos. of slabs) frame structure with normal slab, beam and column.

Assuming sufficient bearing capacity, shallow foundation may be proposed below the building area. The contractor shall carry out extensive soil investigation before the final detailed design.

Structural design methodology

The proposed building is RCC frame structure, with columns forming vertical components. RC Slab - Beam is proposed for the typical floor system. Slabs are considered as rigid diaphragm.

A preliminary three – dimensional finite element computer model to be formulated, incorporating all gravity, wind and seismic loads, to develop the concept framing for the building and ensure that the designed structural system provides satisfactory global building response. The model will be further developed during subsequent design stages to carry out detailed design. Structures and structural elements will be designed by Limit State Method. Due consideration will have given to the accepted theories, experience and modern philosophy of design. In general, the following software shall be utilized during the various stages of the design process.

- ETABS
- STAAD
- SAFE
- Excel program sheets



All designs/checks will be governed by the appropriate Standards and by the other approved codes of practice

Structural Loads and forces

in structural design, account is taken of the dead load, imposed load and wind loads and seismic hazard etc., where applicable.

Dead Loads

The dead loads are calculated on the basis of unit weights of materials given in IS 875-1. The data provided by manufacturers will be used for the specific materials/equipment. The wall considered are light weight block walls & wall thickness as per architectural drawings.

Unless otherwise specified the unit weight of materials will be used as follows.

Reinforced Concrete	25 kN/ m ³
Plain concrete	24 kN/ m ³
Brickwork	20 kN/ m ³
Concrete block work	24 kN/ m ³
Light weight blocks	6.5 kN/ m ³
Saturated Soil	20 kN/ m ³
Glass	23.5 kN/ m ³
Water	9.81 kN/m ³

Block work is considered as a light weight blocks having density not more than 7.5.kN/m³

Following loads shall be considered in structure for analysis:-

- Self weight of structure.
- Slab thickness and floor finish – as per actual.
- Earth fills above basement roof – as per actual.
- Any other loads envisaged during the detailed engineering

Insulation & Water proofing system	0.25 kN/m ² or actual
Floor Finishes	2.0 kN/m ² or actual
Services Cable trays, bus duct, small equipment, false ceiling & Raised floor HVAC PIPES	2.5 kN/m ² or actual
Partitions	2.0 kN/m ² or actual

Live Load



Minimum imposed loads for industrial building are assumed in accordance with IS 875-2, as follows.

Area Description	Live Load on typical floor	
	Uniformly distributed load	Concentrated load
Work areas without machinery/equipment	2.00 kN/m ²	4.5 kN
Work areas with machinery/equipment:		
Light duty	5.00 kN/m ² *	4.5 kN *
Medium duty	7.00 kN/m ² *	4.5 kN *
Heavy duty	10.00 kN/m ² *	4.5 kN *
Boiler rooms and plant rooms	5.00 kN/m ² *	6.7 kN *
Cafeterias and dining rooms	3.00 kN/m ² @	2.7 kN
Corridors, passages and staircases including fire escapes	4.00 kN/m ²	4.5 kN
Corridors, passages, staircases subject to machine loads, wheeled vehicles	5.00 kN/m ² *	4.5 kN *
Kitchen	3.00 kN/m ²	4.5 kN
Toilet and bathroom	2.00 kN/m ²	--

* To be calculated but not less than

@Where unrestricted assembly of persons is anticipated, the value of UDL should be increased to 4.0 kN/m².

Crane load

- For loads acting vertically, the maximum static wheel loads shall be increased by 25% for an electric overhead crane or 10% for a hand-operated crane.
- For the horizontal forces acting transverse to the rails the following percentage of the combined weight of the crab and the load lifted shall be considered.

10% for an electric overhead crane

5% for a hand-operated crane

- For horizontal force acting along the rails,

5% of the static wheel load

- The crane manufacturer data if more conservative an electrically operated crane of 7.5 MT capacities in building no. 2 and 3 will be considered.

Monorail load of 2MT will be considered fir Fire Pump room.

Crane Loads are considered as Live Loads.



Roof Live loads

Appropriate loads as per Cl 4 of IS 875-2

Seismic loads

Design earthquake: 10% chance of being exceeded within a 50 year return period

- Seismic Zone III, as per IS 1893-1 : 2016 for Mumbai metropolitan region
- 5% damping in all modes for reinforced concrete building as per IS1893-1 : 2016
- Occupancy of the building-
- Importance factor $I = 1.0$ as per IS 1893-1 : 2016
- Response reduction factor as per IS 1893-1 : 2016
- Soil type: as per IS 1893-1 : 2016 based on SPT test

Seismic building weight to include all components of self weight, superimposed dead load, any other permanent weight plus 25% of Live Load upto 3 kN/m² and/or 50% Live Load above 3 kN/m² and 0% on roof.

Dynamic analysis as per response spectrum method of IS 1893-1 : 2016.

Wind loads

Design wind speed: 63% chance of exceedance at least once in a 50 successive year

- Basic wind speed $V_b = 44$ m/s as per IS 875-3 : 2015
- Probability factor $k_1 = 1.0$
- Terrain roughness and height factor $k_2 =$ Category ___ is considered
- Topography factor $k_3 =$ as per IS 875-3 : 2015
- Importance factor for cyclonic region $k_4 = 1.0$

Load combinations

Following load combinations will be considered for ultimate limit state:

1.5 DL + 1.5 LL

1.2DL + 1.2 LL ± 1.2WX

1.2DL + 1.2 LL ± 1.2WY

1.5 DL ± 1.5 WX



$$1.5 DL \pm 1.5 WY$$

$$0.9 DL \pm 1.5 WX$$

$$0.9 DL \pm 1.5 WY$$

$$1.2DL + 1.2 LL \pm 1.2RSX$$

$$1.2DL + 1.2 LL \pm 1.2RSY$$

$$1.5 DL \pm 1.5 RSX$$

$$1.5 DL \pm 1.5 RSY$$

$$0.9 DL \pm 1.5 RSX$$

$$0.9 DL \pm 1.5 RSY$$

Following load combinations will be considered for serviceability limit state.

DL+ LL

DL \pm WX

DL \pm WY

DL \pm RSX

DL \pm RSY

Where DL is dead load, LL is live load, RSX is earthquake load is X direction, RSY is earthquake load is Y direction, WX is wind load is X direction and WY is wind load is Y direction.

Materials and minimum durability requirements

- Concrete grade M30
- Main steel reinforcement grade Fe500
- Tie and stirrup steel reinforcement grade Fy250/Fe415



From durability perspective, IS 456 specifies the following minimum values. Actual concrete and reinforcement deterioration resistance (ie durability) properties to be determined following ISO 16204.

	Sub structure	Super structure	
		Exterior	Interior
Exposure condition	Severe	Moderate	Mild
Max. w/c ratio	0.45	0.50	0.55
Min. grade of concrete	M30	M25	M20
Min. cement content (kg/m ³)	320	300	300
Max. crack width (mm)	0.10	0.20	0.30
Minimum clear cover (mm)	45	30	20

- Min. clear cover for footing 50 mm,
- Min. clear cover for column 40 mm.

Minimum Clear cover requirement for fire rating of 2 hours

Beam	Slab		column
Simple support	Continuous	Simple support	Continuous
40	30	35	25
			40

Compound Wall

Compound wall & footings will be designed for a basic wind speed of 45 m /sec as per specification with an importance factor of 1.0. If road is within 2 m from compound wall then, Surcharge of SLW 60 as DIN 1072 will be considered in the analysis & design subject to minimum of 33.3 kN/m².

The analysis and design will be carried out for the worst combination of earth pressure & surcharge. Passive resistance of soil inside the plot will be considered as applicable.

Expansion joints 25 mm wide will be provided in compound wall at a maximum spacing of 12.0 m c/c.

Drainage & Plumbing:

The various systems identified for the project is as follows:

- Storm/ surface water drainage
- Sewage drainage



- c) Chemical discharge
- d) Indoor potable water

Surface water & sewage drainage shall be separate system. While the surface water shall be collected in main drains leading to a soak away/ holding tank, the sewage drainage will be collected through a system of underground pipes and lead to a septic tank of 6.50 m³ capacity for 20 persons or connected to the DM drain system. UPVC material pipes shall be used for the system.

Plant waste water will be collected to an underground water tank, the capacity for which shall be based on, to contain all waste water and 30 minutes of fire water.

Fire pump house Diesel tank drainage system shall be connected to oil manholes. Fire pump deluge spray system drain shall be connected to storm water network. Chemical discharge will lead to acid/alkali resistant tile lined reinforced concrete neutralization pit.

Manholes will be provided at every change of alignment or gradient or at every 15 m maximum internal and 45 m maximum external in straight run.

The storm water drainage will be designed based on hourly maximum rainfall intensity for roof 75 mm./hr and for site 15 mm/hr.

Pavement works

Pavement type

The following types of pavement are to be provided:

Type I

- a) Interlocking concrete blocks to roads within the substation area for vehicular traffic.
- b) Interlocking concrete blocks other than those provided for vehicular traffic.

Thickness of surfacing

The thickness of surfacing and the types of construction of pavement are detailed as under.

Type a) Access for vehicular access.

	Tolerance
1) Interlocking block	80 mm ±3 mm
2) Laying sand course	50 mm
3) Polythene	0.5 mm thick
4) Road base after compaction	200 mm
5) Compacted sub grade	150 mm



Type b) Access for walkways.

1) Interlocking block	60 mm \pm 3 mm
2) Laying sand course	50 mm
3) Polythene	0.5 mm thick
4) Road base after compaction	200 mm
5) Compacted sub grade	150 mm



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