

CHAPTER-4(REVISED)

Annexure-1

LEACHING AND FILTRATION SYSTEM WITH ACCESSORIES

Specifications: TWO UNITS of leaching and filtration system with accessories are required as a COMPLETE SKID MOUNTED SYSTEM for processing of solids (red mud, slag, etc.) using lixivants to extract desired metals. The leaching set up is desired to be made for possible mixing of feed with lixivants (acid/base) using agitators and with provision of gas purging, sample withdrawal, measurement of parameters (temperature, pH, level), sample addition and filtration (directly connected to automatic filter press). Below are the technical specifications for the unit:

1. Leaching System (Refer Fig.1a)

Two leaching tanks (i) one for highly acidic system, and (ii) another for strong alkali system with overhead chain-pulley system for lid opening and cleaning.

1.1. Leaching Tank Details FOR ACIDIC SYSTEM:

- i.** Number of tanks: 1No.
- ii.** Size: ID-910mm X Height-775mm (Tolerance: $\pm 10\text{mm}$)
- iii.** Cone Volume: 0.2m^3 (Tolerance: $\pm 0.01\text{m}^3$)
- iv.** Tank volume: 0.5m^3 (Tolerance: $\pm 0.01\text{m}^3$)
- v.** Tank Top: Flat top with Covered
- vi.** Tank Bottom: Cone type
- vii.** Tank shell thickness: 5mm
- viii.** Tank LID: Detachable Semi-circular pair
- ix.** Leaching tank volume should be able to handle 25-30% solids (red mud, slag, tailings, etc.) with solid specific gravity ($\geq 2.7-3.45\text{g/cc}$) and slurry specific gravity (≥ 1.30)
- x.** Temperature: Ambient- 90°C ($\pm 2^\circ\text{C}$ max) with electrical titanium heating
- xi.** pH and ORP probes: Removable PTFE/Teflon coated pH and ORP probes (pH: 0-14; ORP: 0-1000mV), with suitable port
- xii.** Baffles: 03 Nos, L=700mm, W=60mm
- xiii.** Tank MOC: SS316 coated with high temperature high acid resistant fluoropolymer lining
- xiv.** Working volume: 400L
- xv.** Total volume: 500L

- xvi.** Tank MOC, lining, baffles, drain pipe and other parts should be acid and alkali resistant (acids used: HCl, H₂SO₄, HNO₃, H₃PO₄)
- xvii.** ONE Gas Port: 2" Port at outlet of each tank for bottom to top purging of industrial gases
- xviii.** ONE Drain port: 4" port with valve in each tank
- xix.** ONE Air Pollution system (condenser & gas scrubber) for each leaching tank separately
- xx.** The leaching tanks should be designed to run in batch as well as continuous mode
- xxi.** Interchangeable/replaceable valves with no leakage

1.2. Leaching Tank Details for ALKALI SYSTEM:

- i.** Number of tanks: 1No.
- ii.** Size: ID-910mm X Height-775mm (Tolerance: ±10mm)
- iii.** Cone Volume: 0.2m³(Tolerance: ±0.01m³)
- iv.** Tank volume: 0.5m³(Tolerance: ±0.01m³)
- v.** Tank Top: Flat top with Covered
- vi.** Tank Bottom: Cone type
- vii.** Tank shell thickness: 5mm
- viii.** Tank LID: Detachable Semi-circular pair
- ix.** Leaching tank volume should be able to handle 25-30% solids (red mud, slag, tailings, etc.) with solid specific gravity (≥2.7-3.45g/cc) and slurry specific gravity (≥1.30)
- x.** Temperature: Ambient-90°C (±2°C max) with ceramic heater
- xi.** pH and ORP probes: Removable PTFE/Teflon coated pH and ORP probes (pH: 0-14; ORP:0-1000mV), with suitable port
- xii.** Baffles: 03 Nos, L=700mm, W=60mm
- xiii.** Tank MOC: SS 316
- xiv.** Working volume: 400L
- xv.** Total volume: 500L
- xvi.** Tank MOC, lining, baffles, drain pipe and other parts should be acid and alkali resistant (alkali: NaOH, Na₂CO₃, NH₃)
- xvii.** ONE Gas Port: 2" Port at outlet of each tank for bottom to top purging of industrial gases
- xviii.** ONE Drain port: 4" port with valve in each tank
- xix.** ONE Air Pollution system (condenser & gas scrubber) for each leaching tank separately
- xx.** The leaching tanks should be designed to run in batch as well as continuous mode
- xxi.** Interchangeable/replaceable valves with no leakage

1.2. Feed Preparation tank:

- i. 2 Feed preparation Tank (Total Volume: 300L each)
- ii. Size: \varnothing 750mm X 700mm Total Height (Tolerance: ± 10 mm)
- iii. Lid: Not required
- iv. 2 Agitators: Overhead acid/alkali proof agitator for lixiviant preparation (Fig.1b)
- v. Tank MOC: 1 tank with MS-coated with Fluoropolymer and 1 tank with SS-316
- vi. Tank MOC, lining, baffles, drain pipe and other parts should be acid and alkali resistant (acids used: HCl, H₂SO₄, HNO₃, H₃PO₄; alkali: NaOH, Na₂CO₃, NH₃)
- vii. Tank shell thickness: 5mm
- viii. Baffles: 03 Nos in each tank
- ix. Mounted on movable based skid supported with 4 Nos. heavy duty castor wheels (having 4-way directional lock, Total lock, Wheel face brake),
 - x. *Pump to leaching tank*: The feed slurry from tank passes to the leaching tank press through a drain valve/port via an acid and alkali (acids used: HCl, H₂SO₄, HNO₃, H₃PO₄; alkali: NaOH, Na₂CO₃, NH₃) resistant pump (Fig.1c). The pump should be a PP Feed Pump Positive Displacement 1HP, 5-10Ltrs/Min. (Numbers: 4 Pumps)

1.3. Agitators for leaching tank:

- Number of Agitators: 02 Nos.
- Overhead Agitator with High torque with variable speed
- Full Load RPM: 50-300
- Motor Power: 0.75 HP (max 40% Solids)
- Capacity up to 400L stirring capacities with type 04 Blade propeller Type Impeller blade (Refer Fig.1d). The Agitator parts inside the tank must be epoxy painted acid proof with certification
- Agitator parts should be acid and alkali resistant (acids used: HCl, H₂SO₄, HNO₃, H₃PO₄; alkali: NaOH, Na₂CO₃, NH₃)

1.4. Control Panel for Leaching system and feed preparation tank with Step up and step down provision for all parameters and equipped with overheating safety alarm feature. Display and electronic fittings must be provided from Branded company (Schneider electric/Forbes Marshall/L&T)

1.5. Leaching Tanks should be mounted on skid with steps for each unit: 100 X 100 Channel MS frame with Epoxy Painted.

2. Pump to Filter Press: The leached slurry from tank passes to the Filter press via an acid and alkali (acids used: HCl, H₂SO₄, HNO₃, H₃PO₄; alkali: NaOH, Na₂CO₃, NH₃) resistant pump (Fig.1e). The pump should be a PP Feed Pump Positive Displacement 1HP, 5-10Ltrs,/Min. (Numbers: 2 Pumps)

3. Filter Press:

- i. Units: 1 No.
- ii. Acid-Alkali Resistant Coated Carbon Steel Frame and PP plate type filter press (Fig.1f)
- iii. Dimensions: 610mmx610mmx 17 plates
- iv. Manual Hydraulic Type operation with 15-20min operation for 100kg feed
- v. Plate should have a 150kg maximum capacity of withholding cake (with 50% moisture content)
- vi. Epoxy build primer, with acrylic polyurethane paint for better adhesion and with flatness of the filter plate lower than 25µm ensuring excellent sealing when pressing, and without any leakage when feeding.
- vii. Separate Control Panel with push button provision and alarm system
- viii. Input line should have flow-meter from branded company (Prism/Forbes Marhsall/PCD/Toshniwal)
- ix. Drip tray system via gravity for Liquid collection installed under the filter press, connected to storage tank
- x. Cake collection and drying SS trays-5Nos. (each of 20kg) for each filter press
- xi. Additional inlet provision for cleaning operations

4.Additional Accessories:

- i. 2 Pumps: PP Feed Pump Positive Displacement 1HP, 5-10 L/min, for passing of filtered liquor to storage tank
- ii. Additional Liquor storage HDPE tanks with lid (400L)-3 Nos. (Fig.1g)
- iii. All the fittings, piping's must be acid/alkali proof (PPE/HDPE) and leak proof (O-rings/sealing) with spares (20 joints, 4 temperature sensors, 8 port caps, 1 set of filter cloths for each filter press, 1 set of filter outlets for each filter press, 2 pH-cum-ORP probes, 2 solution volume probes) lasting for 5 years trouble free operation.

5. Warranty: 2 years comprehensive warranty from date of commissioning for vessels, pumps, hardware and electronic items

6. Civil Modifications at site for installation shall be the responsibility of party

7. Selected bidder has to generate engineering drawing and take approval of CSIR-NML

8. **Basis of Evaluation-** Price as per Technical Specifications + Warranty of 24 months from date of commissioning + Engineering Drawing approved by NML+ dedicated training on site+ spares as above

9. **Qualification criteria and acceptance test:**

Qualification criteria:

- i. Vendors who have demonstrated expertise in manufacturing/supply AND successful commissioning of LEACHING SETUP AND FILTER PRESS to research laboratories, PSUs or government agencies, are eligible and should furnish list of such previous supplies.
- ii. Vendor should have completed **at least 1** successful commissioning of the LEACHING SETUP AND FILTER PRESS as per the specifications in last 5 years

Acceptance test:

- i. Vendor should be able to demonstrate successful commissioning of both the units with 100kg raw material and acid/alkali provided by CSIR-NML. The parameters like temperature (90°C), agitation (150rpm, 300rpm), solution volume (400L), pump efficiency, filtration ability of filter press with <5% loss of cake and liquor should be demonstrated in at least two campaigns with two acids/alkali each.
- ii. All the design and parameters mentioned above for leaching, agitation, filtration and spares shall be matched upon receipt of order and on completion of commissioning. The supplier must provide calibration certificate of the items to conform to the designed operational parameters viz., temperature, agitation, pump rating, coating life for acid/alkali resistance.

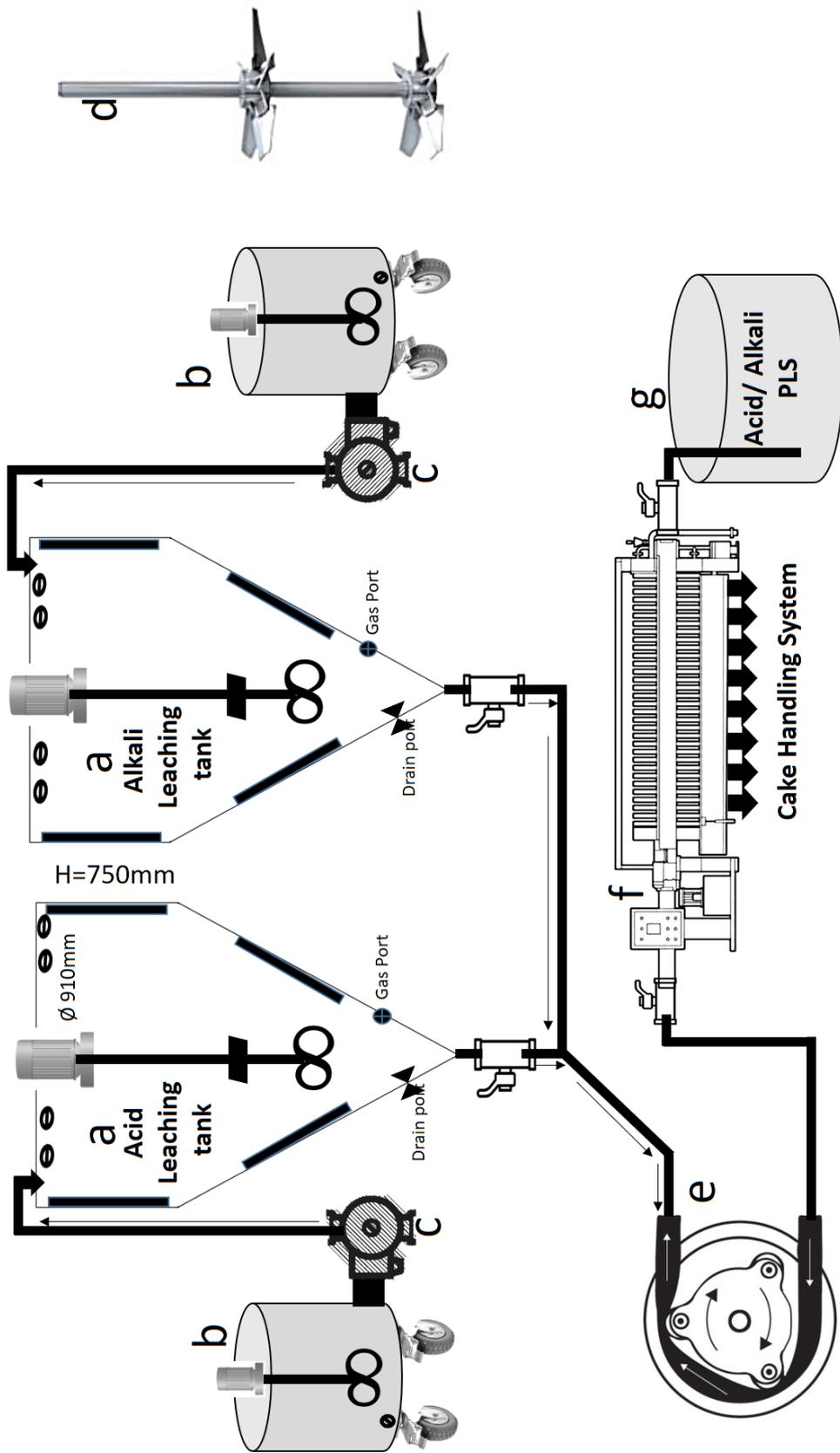


Fig.1: Sketch for the individual unit of leaching tank with filtration system