



TECHNICAL SPECIFICATION (TS)

Subject: Modernization of the Caustic Soda and Brine Evaporation Unit

1. Introduction

- 1.1** This document constitutes a Request for Information (RFI) and is intended to identify solutions available on the market and to collect data for the Contracting Authority's further analyses. The inquiry does not constitute an order or any obligation to select a Contractor or conclude a contract for the execution of the modernization. Information provided in the responses may be used as input material for a potential subsequent procedure (RFP).
- 1.2** The Bidder party will submit an RFI response which will meet the requirements of this specification.
- 1.3** The Bidder shall bear all costs related to the preparation and submission of the response to the RFI.
- 1.4** All information presented in this document is solely for the purpose of preparing a response to the RFI and cannot be used for any other purpose without the prior written consent of the Ordering Party.
- 1.5** Any changes to the provisions, content, and related documents of this Technical Specification must be made in writing to be valid.

2. Current condition of the equipment

At the Anwil S.A. site, there is a Chlorine and Caustic Soda Plant, where chlorine, hydrogen, 30% caustic soda solution, 50% caustic soda solution, as well as sodium hypochlorite and sodium chloride are produced. The Chlorine and Caustic Soda Plant consists of two departments: The Electrolysis and Chlorine Processing Department and the Caustic Soda Department.

The purpose of the currently operated caustic soda and brine concentration unit is as follows:

- concentration of caustic soda produced in membrane electrolysis to the required concentration,
- concentration of depleted brine from the membrane electrolysis process to the required concentration and its return to the electrolysis process,

- production of sodium chloride for the purpose of removing undesirable components from concentrated brine returned to the brine purification unit of the electrolysis plant; in particular sodium sulfate and organic compounds (TOC)

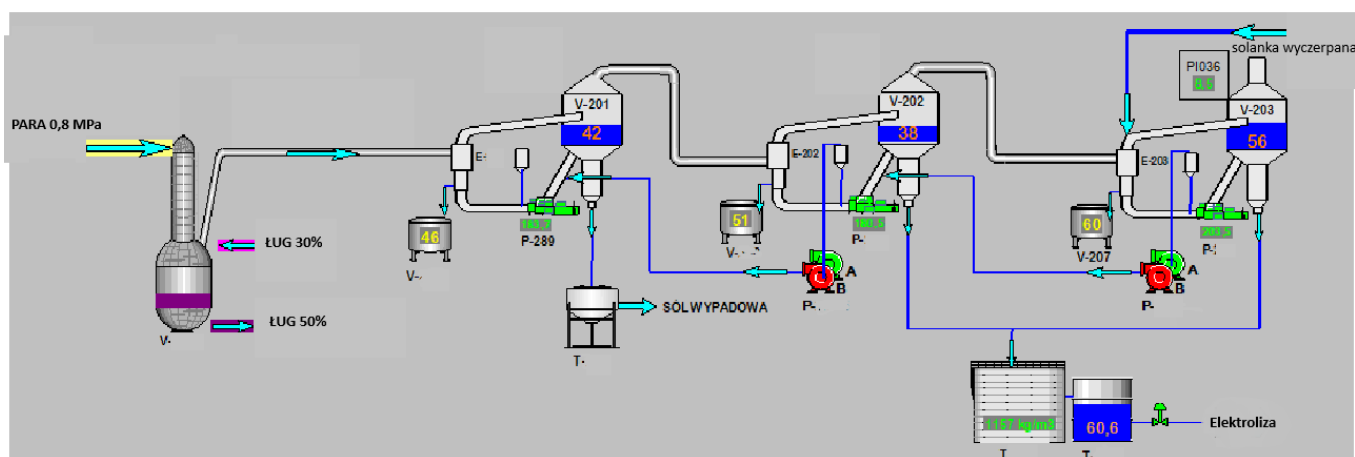
The concentration process of the caustic soda solution and brine takes place in a four-stage (counter-current) evaporation system. The heating medium is low pressure steam. One stage is used for caustic soda concentration, while the remaining three stages are utilized for concentration of the brine stream. The individual stages are interconnected by vapor piping.

Concentration of 30% sodium hydroxide is carried out in a film evaporator. The caustic soda obtained from the electrolysis process is directed to the caustic soda evaporator and/or to the 30% caustic soda storage tank. After the caustic evaporator, 50% caustic soda is collected and transferred to two storage tanks, from which it is loaded into rail tank cars and road tankers.

The brine directed to the concentration process is depleted brine (with a sodium chloride concentration of $180\pm 220\text{ g/dm}^3$, average 200 g/dm^3) originating from the membrane electrolysis process.

The brine, after leaving the electrolyzers, undergoes dechlorination and is then sent to the evaporation unit.

During the brine concentration process, salt crystals are formed as a salt slurry (a mixture of sodium chloride crystals and concentrated brine), from which sodium chloride is subsequently recovered in crystalline form in further processing steps.



A significant part of the equipment and devices existing in the Brine and Caustic Soda Concentration Unit, dates from 1977.

3. Subject of the Inquiry (RFI)

3.1 The subject of the inquiry is to obtain information containing:

- Identification of technological and design changes to the existing plant aimed at limiting and reducing energy consumption,

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- A proposal of modernization aimed at shutdown the production of sodium chloride, removing sodium sulfate in crystalline form and removing organic compounds as TOC from brine:
 - shutdown of sodium chloride production,
 - Addition of a sodium sulfate production unit producing crystalline product (with a minimum purity of 99,9%),
 - Addition of a unit for the removal of organic compounds defined as TOC (Total Organic Carbon) to the existing system,
 - Description of the optimal level of modernization with an emphasis on improving efficiency and reducing energy consumption,
 - Cost and time estimation for the implementation of the full modernization scope, including indication of the level of complexity in terms of implementation time,
 - Identification of risks associated with the implementation of the above changes in the existing system.

The assessment of the technical condition of the main equipment and apparatus may be conducted during the planned maintenance shutdown. The technical condition assessment report will be completed by the internal services of Anwil, by the end of 2026.

3.2 The bidder is requested to address the following points

- Technological variants for: shutdown NaCl production, Na₂SO₄ production (99,9%), TOC removal along with advantages and disadvantages,
- the impact of the proposed modifications on the operational stability of the electrolysis unit (brine quality, safety, reliability),
- risks associated with the age of production unit (1977 r.), and the absence of a complete technical condition assessment at the RFI stage,
- execution risks in an operating (brownfield) environment: installation, commissioning, downtime, equipment availability, spatial constraints,
- environmental risks and products/waste management (including the disposal or utilization of Na₂SO₄ and effluents generated during TOC removal,
- key uncertainties and critical data required to achieve a higher level of cost accuracy.

3.3 Expected format and content of the RFI response

- Methodology and scope of the analysis (assumptions, limitations, exclusions), along with a brief description of the proposed approach.
- A description of at least two variants (if possible) along with justification and comparison of pros and cons.
- Conceptual mass and energy balances and the methodology for calculating “energy gains” (reference base).
- Initial scope of modifications (brownfield) and main points of integration with the existing system (including DCS/ESD).

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- Conceptual assessment of CAPEX (AACE class 4, accuracy +40/-20%) and annual OPEX along with key assumptions.
 - Identification of risks (technical, execution, and operational), recommendations for risk mitigation actions, an indicative schedule (concept, FEED/execution/commissioning) and a list of critical data required for the next stage.
 - Conceptual dimensional and layout drawings of the proposed units, or specification of space requirements
 - Description of proposed solutions at a conceptual level (variants, balances, interfaces) enabling comparison of approaches.
 - References of similar work performed
 - Description of the Contractor's experience in similar scopes of work, as well as a description of the team and competencies (roles and experience) intended for preparing the analysis and availability of key specialists.
 - A schedule for preparing the analysis/response to RFI and a proposed cooperation plan (site survey, input data, workshops).
 - A list of data and documents required from ordering party to prepare a reliable analysis and to possibly proceed to the next stage.

3.4 Input data and assumptions (to be specified/verified in the response)

For the purpose of standardizing comparisons, the ordering party requests accepting (or clear indication of any deviations from) the following input data/assumptions:

- flow rate ranges (min./nom./max.) and their variability for caustic and brine streams (including concentrations and impurities),
- brine quality requirements for electrolysis (including acceptable levels of sulfates and TOC, if available),
- quality requirements and the management of by-products and waste (Na_2SO_4 99,9% – standard/market; streams after TOC removal),
- brownfield constraints (availability of space, shutdown windows, tie-in possibilities),
- standards and requirements for I&C/DCS/ESD, and HSE/ATEX/environmental requirements, that influence the selection of technology.

The Contracting Authority expects the transfer of all economic rights to any studies, reports, compilations, and other materials developed under this assignment (to the extent specified in the contract), including the right to use and modify them for the purposes of further analyses and design work.

During the bidding process, it is possible to conduct a site visit and receive the necessary documentation after signing the NDA.