

Ethanolamines/Glycol Ethers

Tier 3 Procedure

Section No.: 5010
Issue No.: 2.4
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Title: Phosphorous Acid (H_3PO_3) Addition
References: Glossary Of Equipment Identification (Text #114)

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5010: Phosphorous Acid (H_3PO_3) Addition

1.0 Objective:

1.1 To inject H_3PO_3 into the Ethanolamines reactor through T-211 to minimize T-271 bottoms flow, reduce impurities, and TEA Color.

2.0 Responsibility:

2.1 It is the responsibility of operations to ensure the safe and efficient execution of this procedure.

3.0 Method:

3.1 This material will enter the Ethanolamines system, by nitrogen pressure from D-225.

4.0 Safety notations:

4.1 A slicker suit, monogoggles and rubber gloves are required to do any work on the acid tank or lines.

4.2 If the plant trips on oxide, the acid system EBV will also trip.

4.3 If the acid system EBV closes, the acid control valve will also close.

4.4 The acid flow meter is a micromotion that can read flow in either direction. Negative flow will trip the EBV and close the control valve. Negative flow indicates that ammonia is backflowing into the acid lines and tank.

5.0 Special Notations:

5.1 All material produced during an acid run will be placed in the following tanks.

MEA DV-250

DEA DV-260 for Monsanto spec.

TEA DV-255 H_3PO_3

None of this material may be shipped to Europe!

5.2 Glycol 2 cannot receive any A-5503 manufactured with phosphorous acid. The phosphorous may poison their catalyst. They must take TEA instead of A-5503.

5.3 The plant has demonstrated that the impurities and TEA color can be significantly reduced by the addition of approximately 100 - 165 ppm of H_3PO_3 , relative to the EO, into the process.

5.4 The flow of acid is controlled on the picsvax. It is ratioed to the EO flow.

5.5 The acid flow setpoint is calculated as follows.
$$\text{Acid Flow} = \text{PPM}/1,000,000 \times (\text{EO Flow} + \text{NH}_3 \text{ Flow})$$

5.6 The A-5503 spec defines a maximum of 0.9% phosphorous in T-271 bottoms. This should not be a problem based on the above formula. To calculate:
$$\% \text{ phosphorous in A-5503} = \text{Acid Flow}/\text{T-271 Bottoms flow} \times 100$$

6.0 Startup of System and Transition into an Acid Campaign:

6.1 Valve the acid tank and line correctly to flow acid into T-211. Place the controller on computer control (remote).

6.2 Quit adding $NaBH_4$ to DV-272 pots after the acid has been at setpoint for at least 12 hours.

6.3 Leave the Charcoal filter on line until the charcoal delta is less than 1 color unit. At this point, bypass the charcoal filter.

6.4 Verify non-acid storage tanks for transfer of check tanks.

6.5 Decrease still bottoms flow to 600 lb/hr after the acid has been at setpoint for at least 12 hours or until the color has dropped significantly from the non-acid campaign.

6.6 Check the acid inventory.

7.0 Shutdown of System and Transition into a Non-Acid Campaign:

7.1 At the conclusion of an acid run, the whole injection line and pump must be flushed with cold condensate for about one hour and then double blocked and bled.

7.2 Add $NaBH_4$ to DV-272 pots as per the procedure.

7.3 Put Charcoal filter on line as per the procedure.

7.4 Verify non-acid storage tanks for transfer of check tanks.

7.5 Increase still bottoms flow to 1200 lb/hr.

7.6 Close transfer valves after completing all transfers to non-acid tanks.

7.7 Notify Loading personnel that we are now on a non-acid run. They must check with the control room every morning before starting loading pumps to ensure the proper "line-up" of equipment.

8.0 Revisions:

Revision No. 1	12-29-95	Yearly Review
Revision No. 2	12-12-96	Updated for 12/96 - 1/97 plant trial
Revision No. 3	02-03-97	Added section 6 and 7.
Revision No. 4	04-12-97	Changed wording of section 3.1, 4.1, 5.3, 5.4, 6.1 Added sections 4.3, 4.4, 7.6, 7.7 Changed title from "Phosphorous Acid Injection Test" to "Phosphorous Acid Addition"
Revision No. 5	05-19-97	Updated 5.3 and 5.5 to reflect ppm calculation based on total flow instead of EO flow only.