

Ethanolamines/Glycol Ethers Tier 3 Procedure

Section Number: 23
Issue Number: 3.1
Original Date: 12-23-91 **Author:** Tim Dill
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Title: EB Mode Start-Up
References: Glossary Of Equipment Identification (Text # 114)
Swap-Over/Startup Check Sheet
Glycol Ethers Series Swap Over
Double Block & Bleed Check Sheet

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23. EB Mode Start-Up

1.0 Objective:

1.1 To achieve a start up of the ethers plant on the EB series with out damage to equipment or injury to personnel. To avoid accidents and incidents through the use of specific procedures.

2.0 Responsibility:

2.1 It is the responsibility of the operations personnel to ensure that this procedure is fully complied with.

2.2 It is the responsibility of the operations personnel to ensure that this procedure is executed in a safe and efficient manner.

3.0 Special Notation:

3.1 Approximate overhead flows at full rates: (11,000 lb/hr oxide)

3.1.1 T-110 bottoms flow = 20,000 pounds per hour.

3.1.2 T-110 overhead flow = 53,000 pounds per hour with < 1 % EB.

3.1.3 T-120 overhead flow = 14,000 pounds per hour.

3.1.4 T-130 overhead flow = 6,000 pounds per hour.

3.1.5 T-140 overhead flow = 2,500 pounds per hour.

3.1.6 These figures will change depending on the concentration of the rerun material.

3.1.7 D-51A must be in service for DB production to insure color stability for DB. Without charcoal filtration color bodies susceptible to heat and time remain in the product and result in unstable color for DB. All DB pumped to storage must be charcoal filtered prior to transfer.

3.1.8 All dual control valves not being used must be blocked manually to prevent "leak-by". These valves are T-110 overhead, T-130 bottoms, and the alcohol control valve. "Leak-by" could cause faulty flow readings and could result in serious consequences such as alcohol being backed out of the reactors.

3.1.9 It is important that the computer switches be appropriately modified to reflect status of materials for inventory purposes. [REDACTED] This is to insure that the proper pounds of raw materials and products get accounted for in the inventory program. [REDACTED]

[REDACTED] In addition, to allow flexibility for operations, there is also a switch for DV 143B to allow water to be added during the swap for Dowfroth. The switch for DV-143B needs to be on 1 for the water addition, **but must be changed back to the 0 position prior to EB startup so that EB tars inventory can be logged properly.**

4.0 Instrument Changes To Be Made (By Instrument Personnel):

4.1 _____ Switch key on control board to EO

4.2 _____ Change ratio (0-20) and total flow summer cards in nest

4.3 _____ Change micro-vax computer to 'E' series

4.4 These Changes Are In The Nest:

Caution: The reactors must be down before proceeding.

4.4.1 _____ Ft-1046 alcohol flow to T-101 nest position 3,1,8,2 max flow is 65000 #/hr. Using the 0-20 ratio card Honeywell smart cell 0-400.0 inches H2O meter constant 549.82367

4.4.2 _____ Ft-1045EB ethylene oxide to R-101
Nest Position 1,1,3,1
Max Flow Is 15000 #/Hr.
Honeywell Smart Cell 0-96.69
Meter Constant 208.74710

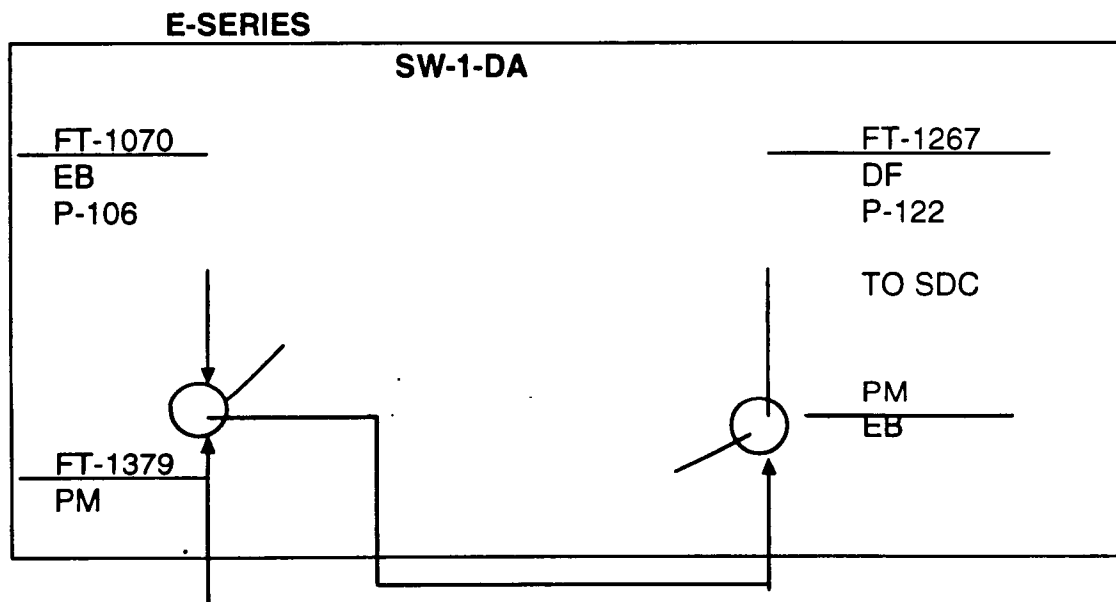
4.4.3 _____ Ft-1232EB T-120 overheads
Nest Position 3,1,4,2
Max Flow is 19,000
Honeywell Smart Cell 0-125.0
Meter Constant 19,000.0

4.4.4 _____ Ft-1287EB T-130 overheads
Nest Position 4,2,6,1
Max Flow Is 9725 With A Linear Signal
Honeywell Smart Cell 0-44.0
Meter Constant 9725.0

4.4.5 _____ Ft-1293 T-130 bottoms flow
Nest Position 4,1,5,2
Max Flow Is 6500.0
Honeywell Smart Cell 0-46.46
Meter Constant 131.97058

4.4.6 _____ Ft-1348EB T-140 bottoms flow
Nest Position 5,1,5,2
Max Flow Is 1500.0
Honeywell Smart Cell 0-12.58
Meter Constant 78.62

4.4.7 _____ Check set up for catalyst for reactor trip. The two switches are in the Dowanols shutdown cabinet in the lower left hand corner labeled SW-1-D. The switches should be set in the positions shown in the drawing below. The left switch should be in the FT-1070 position for the E-series. The right hand switch should be in the PM, EB position. **Caution** these catalyst trip switches should never be operated without bypassing the Reactor Trip System. They will activate the trip system.



4.5 The Following Changes Are On The GPI Computer (runcalc on site specific menu)

4.5.1 _____ Ft-1293 T-130 bottoms flow
Utl A1--Span
Span Is 0-46.46

4.6 Mod5 Changes:

4.6.1 _____ Set T-110 bottoms to T-115 warn 118(ap118) to 175C

5.0 Instrument/Computer Changes To Be Done By Operations:

5.1 _____ Put E-110 on 475 # steam (Switch in field)

5.2 _____ Switch for T-110 OH (By E-110) - move DP cell and valve to "E" series position. The control valve that is not being used must be blocked in manually. This will prevent leak by and possible incorrect ratio readings forcing the alcohol to be "backed-out" of the system.

5.3 _____ Immediately before adding level to T-110, swap the MODE switch on the GPI to EB series (switch program is #8 under site-specific menu (#70)). If this switch is changed before all the drain out is complete, there will be gross error in the inventory report for the day. Should be changed after drain out and before T-110 is started to be refilled with crude.

5.3.1. Below are the possible selections for the Glycol Ethers product switches. In order for the production to be calculated correctly, these switches have to be set properly.

Glycol Ethers Products

0 = EB Product

1 = PM Product

DV-143B When on EB product Series

0 = EB Tars

1 = Water for finished Dowfroth flush (be sure that switch is back to 0 prior to EB tars being fed to DV-143B)

6.0 Operational Procedures

6.1 Take E-220 Off Of Flash Steam During Startup If The Reboilers Have Been Opened For Maintenance. This Will Prevent Inerts From Getting Into The Process.

6.2 Put all bottoms pumps on there own seal flush.

6.3 Put a level in T-110 from DV-113, warm up E-110 and level control T-110 back to DV-113. (The rerun flow to T-110 needs to be about 2,000 pounds per hour after start up)

6.4 All dual control valves not being used must be blocked manually to prevent "leak-by". These valves are T-110 OH, T-130 bottoms, and the alcohol control valve. "Leak-by" could cause faulty loading and could result in serious consequences such as alcohol being backed out of the reactors.

6.5 The cooling tower water on E-111 needs to be about 1.2mm. Watch the temperature across the exchanger, if it gets to be more than 14 degrees, put another P-500 on line. E-111 cooling tower water return valve should be set at 75% open.

6.6 The Reactor Shell Pressure Should Already Be Controlling At About 200 PSIG On R-101 And 210 PSIG On R-102. Start P-104 B On Total Recirculation, Keeping An Eye On The Discharge Pressure And Amps. Not To Exceed 700 PSIG Discharge Pressure And 245 Amps. The Board Person And Outside Operator Must Communicate To Maintain These Conditions. Slowly Open The

Manual Block Valve At Inlet To E-102. Monitor Feed Pressure Of R-101 As Well As R-102 Making Necessary Recirculation Adjustments To Stay Below The Set Pressure Of Safety Valves. It May Be Necessary To Open The Alcohol Control Valve To T-110 To Aid In This Process. Both The Board Person And Outside Operator Must Monitor This Process Until The System Is Pressured Up And The Manual Block Valves Are Completely Opened.

6.7 When You Are Ready For Oxide, Start the P-101 B that was not used on the last series at the following rates or use the rates specified in the PICS by the Area Engineer: **Reactor temperature must be 60°C before oxide is started.**

Oxide = 10,000 Pounds Per Hour.

Ratio (6.0) = 60,000 Pounds Per Hour.

Catalyst Flow Will Be About 500 Pounds Per Hour.

Acid Flow (Oleic) = 80 Pounds Per Hour.

6.8 E-110 Steam: Dial pressure to zero on steam selector gauge in field. Select 475# steam on selector switch at ground level by E-110. Open bleed on control valve loop. Dial pressure to 3-1/2 psig. After condensate stops bleeding, close the control valve bleed. Dial pressure to 15 psig.

6.9 When starting up T-110 increase the steam and overhead flows slowly. If this is done too fast the reboiler will pressure up and give us problems. It is very important not to run excess steam on E-110. This will overload the condenser which will carry over alcohol. Run 500lb/hr steam on E-110 for 30 minutes. Run 1000lb/hr steam on E-110 for 10 minutes. Run 2000lb/hr steam on E-110 for 10 minutes. Run 3000lb/hr steam on E-110 for 10 minutes. Then increase the steam as needed. This will prevent the tubes in E-110 from being thermally shocked. Run T-110 level at 65%.

6.10 Maintain 3 to 4,000 pounds per hour rerun from DV-113 (or whatever T-110 will handle) so DV-113 will be empty when we are ready to do a butyl ethers dump.

6.11 Run the pressure at about 450 mmHg on T-110. Watch for alcohol carry over in VP-110. If this happens, increase the overhead flow on T-110.

6.12 Be aware of the possibility of product carryover to D-601, D-602 and D-180. We need to limit the possibility of material overflowing from D-180.

6.13 Use the same ejector for T-130 and T-140.

6.14 Put T-140 bottoms through E-143. Maintain 9+ units recirculation on E-140.

6.15 Once we are making good product, flush the check tanks to reduce contamination in the finish products. Pump the flush material back to DV-113.

7.0 Control Points On Finishing Towers:

7.1 T-110 = tray 13 for any amount of EB in OH's. (about 145 degrees f.)

7.2 T-120 = tray 19 (100 - 150 degree range) run (142 - 144 degrees

7.3 T-130 = tray 4 (150 - 200 degree range) run (temperature 183 to 185 degrees)

8.0 Special Notation:

8.1 Keep a close eye on R-102 outlet pressure, it alarms at 140 PSIG and trips at 100 PSIG. Keep it above the alarm point by lowering the alcohol flow slightly if needed. It should run around 152 PSIG with low EB in T-110 overheads and higher with more EB in T-110 overheads. P-104 total flow will need to run above maximum flow on the curve until the rates get up to control the product pressure in the reactors. As the oxide load comes up this pressure will drop and we will be able to lower the total flow.

8.2 Once all columns are running put P-110 and P-120 on T-130 overheads seal flush.

8.3 All DB must be charcoal filtered prior to transfer to storage. Material produced during startup, prior to putting D-51A into service, must be rerun.

9.0 Instrument Field Settings

9.1 The following are instrumentation hardware settings that should stay in the designated position at all times.

9.2 _____ Switch for T-140 OH flow(north of D-180)--stay in 'P' series (ft-1352)

9.3 _____ Alcohol control valve stays in EB series

9.4 _____ Switch for reactor coil outlet flow (on deck by R-101) switches should stay in EB series

10.0 Revision:

Revision #1 4-18-97 Revised 9.5 and 9.6 and PDP-11 to GPI

Revision #2 5.5.97 Resorted all instrument/operations tasks and renumbered

Revision #3