



## PTT Phenol Company Limited

### Plant Technical

**SO-(PH-P1-TE)-1100-010**

**Reduce S40 consumption at Benzene Column (V-1101) by reduce recycle Benzene feed to R-1102**

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### Reviewer list

Reviewer	Position	Unit Code

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Rev.	Effective Date	Detail	Updated by
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### **Related Units**

Unit Code	Unit Name
PH-P1-TE	Plant Technical

### **Related KPI**

KPI Measure	Description / Calculation	Target (unit)

### **Related Law**

Law Name

### **Related Documents**

Document ID	Document Name
SO-(PH-P1-TE)-1100-001	CONTROL PARAMETER SPECIFICATION QMAX UNIT

### **External Reference Documents**

Document Name



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## 1. Purpose/Objective

### 1.1 ที่มาและความสำคัญ (Background)

According to the emergency shutdown due to power outage leading to high specific energy consumption (SEC) in Apr-21 and the forecast YTD SEC tends to exceed the target plan at 6,497 MJ/T Co-Product as shown in the figure below:

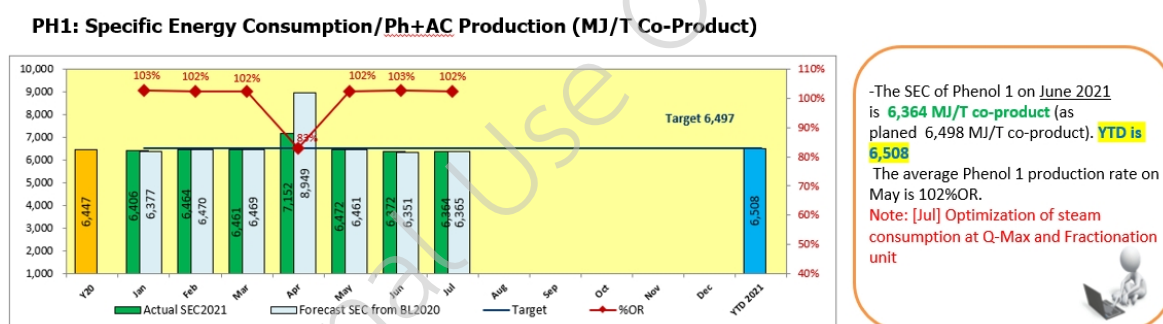


Figure 1 shows the SEC of Phenol 1 in Y2021

Therefore, in order to improve energy efficiency and reduce operating cost, PE would like to submit the operating guideline to reduce S40 steam consumption by reduce recycle Benzene feed to R-1102 and continuously control the quality of effluent R-1102 and distillation product in the control specification.

### 1.2 วัตถุประสงค์ (Objective)

- 1.2.1 Minimize steam consumption at V-1101 by reduce recycle Benzene feed to R-1102 to improve SEC as target.
- 1.2.2 Control the quality of R-1102 Effluent (SN-1104) and distillation product at Recycle Benzene (SN-1103) and V-1101 Bottoms (SN-1105) in the control specification.

### 1.3 ปัญหาและสิ่งที่พบ (Observation)

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## 2. Scope

This operating guideline is applied with PTT Phenol Co.ltd. (PPCL)

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Maptaphut, Amphoe Mueang Rayong, Rayong 21150

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### 3. List

#### 3.1 แผนงานการทำงาน (Schedule)

Activities	Aug-21				
	W1	W2	W3	W4	W5
Review Operating Guideline					
Decrease benzene recycle flow by 0.5 m <sup>3</sup> /h/step/day shift			Day Shift	Day Shift	
Monitor Conditions and Sampling Results					
Collect Data and Summary					

#### 3.2 ขั้นตอนการทำงาน (Instruction/Steps)

##### 3.2.1 Record profile temp. of V-1101, inlet temp R-1102, %Conversion rate of R-1102

Q-Component Target	Target	Current	Lag- indicator
Benzene recycle flow rate to R-1102 (FIC-11-0804.PV), m <sup>3</sup> /h	22 or depend on SN-1103(BZ≥93%wt)	26.6	SN-1104 (Cu ≥32wt%, DIPB≤11.5wt%)
Middle temperature (TIC-11-1003.PV), °C	126.5 - 127.9	126.6	SN-1103 (Cu < 7 wt%)
Bottom temperature (TI-11-1004.PV), °C	189.6 - 190.4	189.9	SN-1105 (Bz < 0.0038 wt%)
R/D ratio	0.71 - 0.72	0.719	
S40 Steam (FIC-11-1004.PV), m <sup>3</sup> /h	11.15	11.85	
Inlet temperature of R-1102 (TIC-11-0902.PV), °C	137.6-141.2	139.6	
Diff. pressure of V-1103 (PDI -11-1703.PV), kg/cm <sup>2</sup>	< 0.215	0.211	DIPB not accumulate at V-1103

3.2.2 Gradually decrease Benzene recycle to R-1102 (FIC-11-0804.PV) from 26.6 m<sup>3</sup>/h to 22 m<sup>3</sup>/h downwards in step of 0.5 m<sup>3</sup>/h/dayshift in order to confirm the conversion at R-1102 & V-1103 is not accumulate result as PDI -11-1703 pressure high and leading to upset condition

Note:

- Closely monitor bottom of V-1101 benzene column level will be maintained to indicate it steady complete reaction of R-1102

- Can compensate S40 heat at E-1104 to increase reaction of R-1102 and will be decreased after can control condition V-1103 back to normal

3.2.3 APC of Benzene column (V-1101) will reduce S40 steam (FIC-11-1004.PV) in order to decrease the internal reflux flow (FIC-11-1006.PV) approximately  $3.4 \text{ m}^3$  to maintain R/D ratio at 0.72

3.2.4 Monitor R-1102 effluent, SN-1104 (collect sampling after adjust 3 h), Q-component  $\text{CU} \geq 32\text{wt}\%$ ,  $\text{DIPB} \leq 11.5\text{wt}\%$

3.2.5 Monitor condition of V-1101 as follows:

- Keep reflux ratio at 0.72
- Middle temp (TIC-11-1003.PV) at  $126.5\text{-}127.5^\circ\text{C}$
- BTM temp (TIC-11-1004.PV) at  $189.6\text{-}190.4^\circ\text{C}$
- BTM level (LIC-11-1001.PV) at 40-60%
- SN-1103 monitor Benzene purity 1 time /day ( $\text{Cu} < 7 \text{ wt}\%$ )

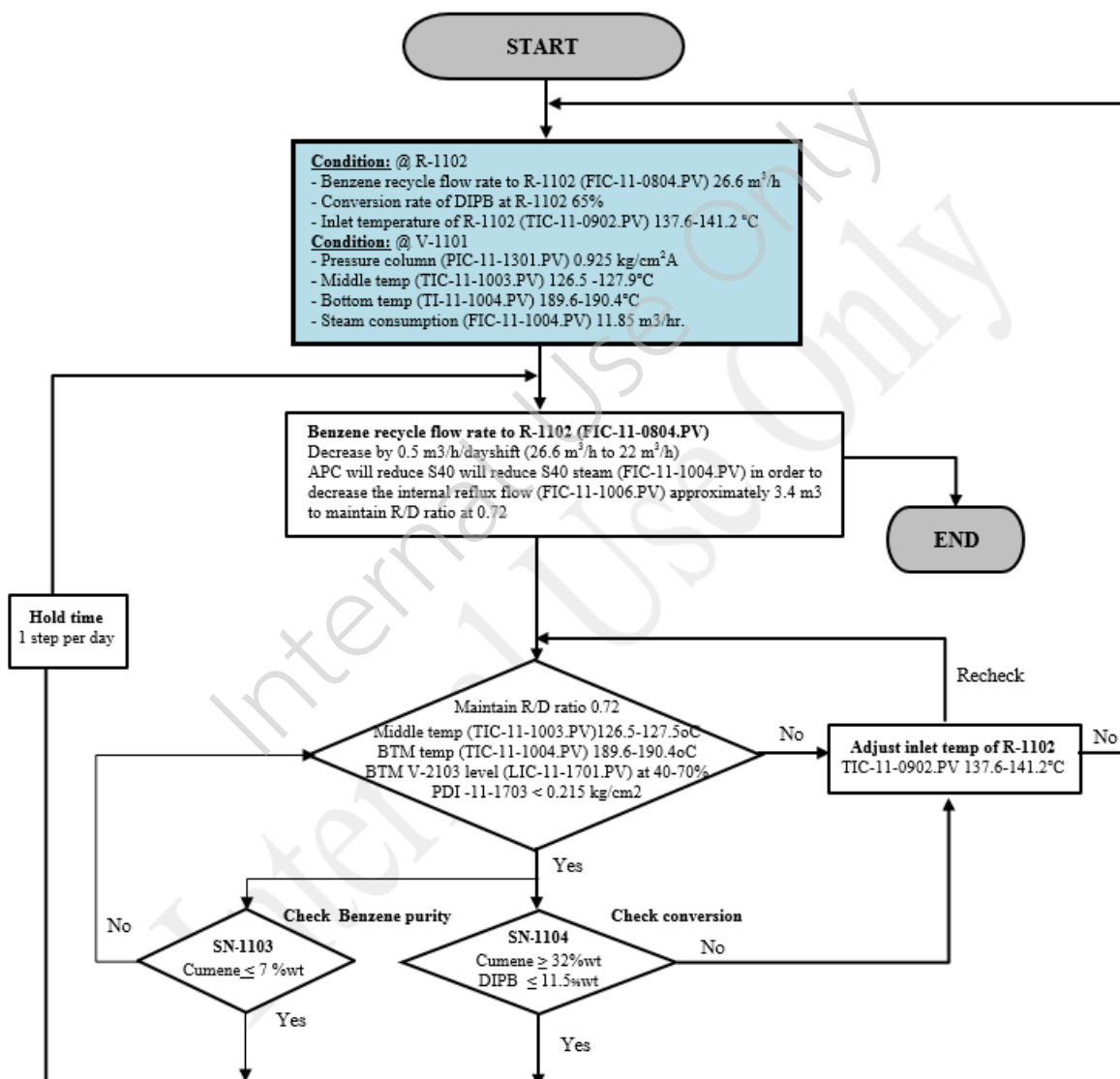
3.2.5 Monitor condition of V-1103

- Maintain BTM level (LIC-11-1701.PV) at 40-70% (if trend of LIC-11-1701 is out of control range, the inlet temp of R-1102 should be adjusted)

3.2.6 Monitor conversion rate of DIPB at R-1102, it should not lower than before adjust condition (65%conversion).

3.2.7 Back to do step 3.2.2 again until meet the target or criteria. Otherwise, hold operating condition of Benzene Column (V-1101) and collect data for summarizing the results

### Trial workflow for steam optimization







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**Additional sampling request**

<b>R-1102 Effluent</b>	<b>SN-1104</b>	<b>Sampling time</b>
Cumene	$\geq 32\text{wt}\%$	Routine 1/wk (Sat), Additional request
DIPB	$\leq 11.5\text{wt}\%$	1/after adjust Routine 1/wk (Sat), Additional request 1/after adjust
<b>Recycle Benzene</b>	<b>SN-1103</b>	<b>Sampling time</b>
Cumene	7%wt max.	Routine 1/wk (Sat.), Additional request 1/after adjust
<b>V-1101 Bottom</b>	<b>SN-1105</b>	<b>Sampling time</b>
Benzene	0.0038%wt max.	Routine Mon/Wed/Fri, Additional request 1/after adjust