ChE 4N04 Assignment 6 Solutions grading scheme.

Cover Letter (4 marks)

Question 1 (18 marks)

1. This is a phthalic anhydride tower (separates out Naphthoquinone).
2. This is a phthalic anhydride reflux drum.
3. This is a heat exchanger that condenses phthalic anhydride vapours.
4. Fed at 30C, returned at less than 45C.
5. If too high, it will leave scale and residues precipitate out.
6. Piping and Instrumentation Diagram
7. Not typically.
8. Solid (unbroken) line with // strikethroughs, i.e. -----//---. Pneumatic lines are compressed gas, usually air.
9. A circle with FI or FIT written in it and line inside the circle
10. No question

Question 2 (42 marks) Solutions were obtained as a group, during tutorial.

1. Overview
    a. (2 marks)
    b. (2 marks)
2. Piping
    a. (2 marks)
    b. (2 marks)
    c. (2 marks)
    (3 marks)
    d. (2 marks)
    d. (2 marks)
    e. (2 marks)
    f. (2 marks)
3. Pump
    a. (4 marks)
    (2 marks)
    b. (3 marks)
4. Tower
    a. (2 marks)
    c. (4 marks)
    d. (2 marks)
    e. For exchanger E-24:
        i. (2 marks)
        ii. (2 marks)

Question 3 (20 marks)

Question 4 (16 marks, calculations 6 marks and graph 10 graphs) (Borrowed with permission from Group A02)

Keep in mind that the graph may be transposed (on its side). This is still correct.

- Highest Total Flow Possible: 170 tonnes/hr
- Lowest Total Flow Possible: 50 tonnes/hr
- Highest mass fraction possible: 0.29
    - derived: max naphthalene flow/ (naphthalene flow + min air flow) = 20/(20 + 50) = 0.29

The operating window is depicted below: