# HOT GAS DEFROST PIPING DIAGRAMS

## TABLE OF CONTENTS

1. **INTRODUCTION** .......................................................................................................................... 2

2. **RECIRCULATED SYSTEMS** ......................................................................................................... 3
   2.1. Figure 1: Bottom Feed, 3-Pipe, Vertical Headers ................................................................. 3
   2.2. Figure 2: Bottom Feed, 3-Pipe, Horizontal Headers ................................................................. 4
   2.3. Figure 3: Bottom Feed, 2-Pipe, Vertical Headers ................................................................. 5
   2.4. Figure 4: Bottom Feed, 2-Pipe, Horizontal Headers ................................................................. 6
   2.5. Figure 5: Bottom Feed, 4-Pipe, Vertical Headers ................................................................. 7
   2.6. Figure 6: Bottom Feed, 4-Pipe, Horizontal Headers ................................................................. 8
   2.7. Figure 7: Top Feed, 3-Pipe, Vertical Headers ........................................................................ 9
   2.8. Figure 8: Top Feed, 3-Pipe, Horizontal Headers .................................................................... 10
   2.9. Figure 9: Top Feed, 4-Pipe, Vertical Headers ........................................................................ 11
   2.10. Figure 10: Top Feed, 4-Pipe, Horizontal Headers ................................................................ 12

3. **CONTROLLED PRESSURE RECEIVER (CPR)** ....................................................................... 13
   3.1. Figure 11: Bottom Feed, 3-Pipe, Vertical Headers ................................................................. 13
   3.2. Figure 12: Bottom Feed, 3-Pipe, Horizontal Headers ............................................................. 14
   3.3. Figure 13: Bottom Feed, 4-Pipe, Vertical Headers ................................................................. 15
   3.4. Figure 14: Bottom Feed, 4-Pipe, Horizontal Headers ............................................................. 16
   3.5. Figure 15: Top Feed, 3-Pipe, Vertical Headers ...................................................................... 17
   3.6. Figure 16: Top Feed, 3-Pipe, Horizontal Headers .................................................................. 18
   3.7. Figure 17: Top Feed, 4-Pipe, Vertical Headers ...................................................................... 19
   3.8. Figure 18: Top Feed, 4-Pipe, Horizontal Headers ................................................................ 20

4. **DIRECT EXPANSION (DX)** ..................................................................................................... 21
   4.1. Figure 19: 3-Pipe, Separate Condensate Return, Vertical Headers ........................................ 21
   4.2. Figure 20: 3-Pipe, Liquid Line Condensate Return, Vertical Headers .................................... 22

5. **GRAVITY FLOODED** ................................................................................................................. 23
   5.1. Figure 21: 3-Pipe, Vertical Headers ......................................................................................... 23
1. INTRODUCTION

1.1. This document reviews standard hot gas defrost piping diagrams for recirculated, controlled pressure receiver (CPR), direct expansion and gravity flooded evaporator systems.
2. RECIRCULATED SYSTEMS

2.1. Figure 1: Bottom Feed, 3-Pipe, Vertical Headers

**FIGURE 1**

Recirculated Bottom Feed
3-Pipe Hot Gas Defrost
Vertical Headers
2-Pass Pan Loop

**Legend**

- **STRAINER**
- **CHECK VALVE**
- **GLOBE VALVE**
- **SOLENOID VALVE**
- **DEFROST PRESSURE REGULATOR**
- **GAS POWERED SUCTION STOP VALVE**
- **HAND EXPANSION VALVE**

- **HGD** HOT GAS DEFROST SUPPLY
- **LTRS** LOW-TEMP RECIRCULATED SUCTION
- **LTRL** LOW-TEMP RECIRCULATED LIQUID
- **→** HOT GAS FLOW
- **→** SATURATED LIQUID FLOW
- **→** SATURATED LIQUID & VAPOR FLOW
2.2. Figure 2: Bottom Feed, 3-Pipe, Horizontal Headers

FIGURE 2

Recirculated Bottom Feed
3-Pipe Hot Gas Defrost
Horizontal Headers
2-Pass Pan Loop

STRAINER
CHECK VALVE
GLOBE VALVE
SOLENOID VALVE
DEFROST PRESSURE REGULATOR
GAS POWERED SUCTION STOP VALVE
HAND EXPANSION VALVE

HGD  HOT GAS DEFROST SUPPLY
LTRS  LOW-TEMP RECIRCULATED SUCTION
LTRL  LOW-TEMP RECIRCULATED LIQUID
HOT GAS FLOW
SATURATED LIQUID FLOW
SATURATED LIQUID & VAPOR FLOW
2.3. Figure 3: Bottom Feed, 2-Pipe, Vertical Headers

FIGURE 3
Recirculated Bottom Feed
2-Pipe Hot Gas Defrost
Vertical Headers
1-Pass Pan Loop

STRAINER
CHECK VALVE
GLOBE VALVE
SOLENOID VALVE
DEFROST PRESSURE REGULATOR
GAS POWERED SUCTION STOP VALVE
HAND EXPANSION VALVE

HGD    HOT GAS DEFROST SUPPLY
LTRS   LOW-TEMP RECIRCULATED SUCTION
LTRL   LOW-TEMP RECIRCULATED LIQUID
        HOT GAS FLOW
        SATURATED LIQUID FLOW
        SATURATED LIQUID & VAPOR FLOW
2.4. Figure 4: Bottom Feed, 2-Pipe, Horizontal Headers

**FIGURE 4**

Recirculated Bottom Feed
2-Pipe Hot Gas Defrost
Horizontal Headers
1-Pass Pan Loop

- STRAINER
- CHECK VALVE
- GLOBE VALVE
- SOLENOID VALVE
- DEFROST PRESSURE REGULATOR
- GAS POWERED SUCTION STOP VALVE
- HAND EXPANSION VALVE
- HGD  HOT GAS DEFROST SUPPLY
- LTRS  LOW-TEMP RECIRCULATED SUCTION
- LTRL  LOW-TEMP RECIRCULATED LIQUID
-   HOT GAS FLOW
-   SATURATED LIQUID FLOW
-   SATURATED LIQUID & VAPOR FLOW

NOTE: LIQUID OVERFEED ORIFICES ARE REQUIRED!
2.5. Figure 5: Bottom Feed, 4-Pipe, Vertical Headers

**FIGURE 5**

Recirculated Bottom Feed
4-Pipe Hot Gas Defrost
Vertical Headers
1-Pass Pan Loop

STRAINER
CHECK VALVE
GLOBE VALVE
SOLENOID VALVE
SPRING LOADED CHECK VALVE
GAS POWERED SUCTION STOP VALVE
HAND EXPANSION VALVE
SIGHT GLASS

HGD  HOT GAS DEFROST SUPPLY
LTRS  LOW-TEMP RECIRCULATED SUCTION
LTRL  LOW-TEMP RECIRCULATED LIQUID
HOT GAS FLOW
SATURATED LIQUID FLOW
SATURATED LIQUID & VAPOR FLOW
2.6. Figure 6: Bottom Feed, 4-Pipe, Horizontal Headers

FIGURE 6

Recirculated Bottom Feed
4-Pipe Hot Gas Defrost
Horizontal Headers
1-Pass Pan Loop

STRAINER
CHECK VALVE
GLOBE VALVE
SOLENOID VALVE
SPRING LOADED CHECK VALVE
GAS POWERED SUCTION STOP VALVE
HAND EXPANSION VALVE
SIGHT GLASS

HGD  HOT GAS DEFROST SUPPLY
LTRS  LOW-TEMP RECIRCULATED SUCTION
LTRL  LOW-TEMP RECIRCULATED LIQUID
→  HOT GAS FLOW
→  SATURATED LIQUID FLOW
→  SATURATED LIQUID & VAPOR FLOW
2.7. Figure 7: Top Feed, 3-Pipe, Vertical Headers

FIGURE 7
Recirculated Top Feed
3-Pipe Hot Gas Defrost
Vertical Headers
2-Pass Pan Loop

STRAINER          HGD       HOT GAS DEFROST SUPPLY
CHECK VALVE       LTRS      LOW-TEMP RECIRCULATED SUCTION
GLOBE VALVE       LTRL      LOW-TEMP RECIRCULATED LIQUID
SOLENOID VALVE     →         HOT GAS FLOW
DEFROST PRESSURE REGULATOR   →         SATURATED LIQUID FLOW
GAS POWERED SUCTION STOP VALVE    →         SATURATED LIQUID & VAPOR FLOW
HAND EXPANSION VALVE
2.8. Figure 8: Top Feed, 3-Pipe, Horizontal Headers

**FIGURE 8**

Recirculated Top Feed
3-Pipe Hot Gas Defrost
Horizontal Headers
2-Pass Pan Loop

---

- **STRAINER**
- **CHECK VALVE**
- **GLOBE VALVE**
- **SOLENOID VALVE**
- **DEFROST PRESSURE REGULATOR**
- **GAS POWERED SUCTION STOP VALVE**
- **HAND EXPANSION VALVE**
- **HGD**  HOT GAS DEFROST SUPPLY
- **LTRS**  LOW-TEMP RECIRCULATED SUCTION
- **LTRL**  LOW-TEMP RECIRCULATED LIQUID
- **HOT GAS FLOW**
- **SATURATED LIQUID FLOW**
- **SATURATED LIQUID & VAPOR FLOW**
2.9. Figure 9: Top Feed, 4-Pipe, Vertical Headers

**FIGURE 9**

Recirculated Top Feed
4-Pipe Hot Gas Defrost
Vertical Headers
1-Pass Pan Loop

STRAINER

CHECK VALVE

GLOBE VALVE

SOLENOID VALVE

GAS POWERED SUCTION STOP VALVE

HAND EXPANSION VALVE

SIGHT GLASS

HGD HOT GAS DEFROST SUPPLY

LTRS LOW-TEMP RECIRCULATED SUCTION

LTRL LOW-TEMP RECIRCULATED LIQUID

HOT GAS FLOW

SATURATED LIQUID FLOW

SATURATED LIQUID & VAPOR FLOW
2.10. Figure 10: Top Feed, 4-Pipe, Horizontal Headers

FIGURE 10

Recirculated Top Feed
4-Pipe Hot Gas Defrost
Horizontal Headers
1-Pass Pan Loop

---

STRAINER   HGD   HOT GAS DEFROST SUPPLY
CHECK VALVE LTRS  LOW-TEMP RECIRCULATED SUCTION
GLOBE VALVE LTRL  LOW-TEMP RECIRCULATED LIQUID
SOLENOID VALVE   →  HOT GAS FLOW
GAS POWERED SUCTION STOP VALVE → SATURATED LIQUID FLOW
HAND EXPANSION VALVE → SATURATED LIQUID & VAPOR FLOW
SIGHT GLASS
3. CONTROLLED PRESSURE RECEIVER (CPR)

3.1. Figure 11: Bottom Feed, 3-Pipe, Vertical Headers

FIGURE 11

Controlled Pressure Receiver (CPR) Bottom Feed
3-Pipe Hot Gas Defrost
Vertical Headers
2-Pass Pan Loop

- STRAINER
- CHECK VALVE
- GLOBE VALVE
- SOLENOID VALVE
- DEFROST PRESSURE REGULATOR
- GAS POWERED SUCTION STOP VALVE
- HAND EXPANSION VALVE

HGD  HOT GAS DEFROST SUPPLY
LTRS  LOW-TEMP RECIRCULATED SUCTION
LTRL  LOW-TEMP RECIRCULATED LIQUID
HOT GAS FLOW
SATURATED LIQUID FLOW
SATURATED LIQUID & VAPOR FLOW
3.2. Figure 12: Bottom Feed, 3-Pipe, Horizontal Headers

**FIGURE 12**

Controlled Pressure Receiver (CPR) Bottom Feed
3-Pipe Hot Gas Defrost
Horizontal Headers
2-Pass Pan Loop

---

**Diagram Symbols:****

- **STRAINER**
- **CHECK VALVE**
- **GLOBE VALVE**
- **SOLENOID VALVE**
- **DEFROST PRESSURE REGULATOR**
- **GAS POWERED SUCTION STOP VALVE**
- **HAND EXPANSION VALVE**

- **HGD** HOT GAS DEFROST SUPPLY
- **LTRS** LOW-TEMP RECIRCULATED SUCTION
- **LTRL** LOW-TEMP RECIRCULATED LIQUID
- **HOT GAS FLOW**
- **SATURATED LIQUID FLOW**
- **SATURATED LIQUID & VAPOR FLOW**
3.3. Figure 13: Bottom Feed, 4-Pipe, Vertical Headers

**FIGURE 13**

Controlled Pressure Receiver (CPR) Bottom Feed
4-Pipe Hot Gas Defrost
Vertical Headers
1-Pass Pan Loop

---

**Legend:**
- **STRAINER**
- **CHECK VALVE**
- **GLOBE VALVE**
- **SOLENOID VALVE**
- **SPRING LOADED CHECK VALVE**
- **GAS POWERED SUCTION STOP VALVE**
- **HAND EXPANSION VALVE**
- **SIGHT GLASS**

**Pipe Symbols:**
- **HGD** - HOT GAS DEFROST SUPPLY
- **LTRS** - LOW-TEMP RECIRCULATED SUCTION
- **LTRL** - LOW-TEMP RECIRCULATED LIQUID
- **HOT GAS FLOW**
- **SATURATED LIQUID FLOW**
- **SATURATED LIQUID & VAPOR FLOW**
FIGURE 14

Controlled Pressure Receiver (CPR) Bottom Feed
4-Pipe Hot Gas Defrost
Horizontal Headers
1-Pass Pan Loop

---

3.4. Figure 14: Bottom Feed, 4-Pipe, Horizontal Headers

---

STRAINER
CHECK VALVE
GLOBE VALVE
SOLENOID VALVE
SPRING LOADED CHECK VALVE
GAS POWERED SUCTION STOP VALVE
HAND EXPANSION VALVE
SIGHT GLASS

---

HGD HOT GAS DEFROST SUPPLY
LTRS LOW-TEMP RECIRCULATED SUCTION
LTRL LOW-TEMP RECIRCULATED LIQUID
HOT GAS FLOW
SATURATED LIQUID FLOW
SATURATED LIQUID & VAPOR FLOW
3.5. Figure 15: Top Feed, 3-Pipe, Vertical Headers

FIGURE 15

Controlled Pressure Receiver (CPR) Top Feed
3-Pipe Hot Gas Defrost
Vertical Headers
2-Pass Pan Loop

STRAINER
CHECK VALVE
GLOBE VALVE
SOLENOID VALVE
DEFROST PRESSURE REGULATOR
GAS POWERED SUCTION STOP VALVE
HAND EXPANSION VALVE

HGD  HOT GAS DEFROST SUPPLY
LTRS  LOW-TEMP RECIRCULATED SUCTION
LTRL  LOW-TEMP RECIRCULATED LIQUID
        HOT GAS FLOW
        SATURATED LIQUID FLOW
        SATURATED LIQUID & VAPOR FLOW
3.6. Figure 16: Top Feed, 3-Pipe, Horizontal Headers

**FIGURE 16**

Controlled Pressure Receiver (CPR) Top Feed
3-Pipe Hot Gas Defrost
Horizontal Headers
2-Pass Pan Loop

- STRAINER
- CHECK VALVE
- GLOBE VALVE
- SOLENOID VALVE
- DEFROST PRESSURE REGULATOR
- GAS POWERED SUCTION STOP VALVE
- HAND Expansion VALVE

HGD  HOT GAS DEFROST SUPPLY
LTRS  LOW-TEMP RECIRCULATED SUCTION
LTRL  LOW-TEMP RECIRCULATED LIQUID
HOT GAS FLOW
SATURATED LIQUID FLOW
SATURATED LIQUID & VAPOR FLOW
3.7. Figure 17: Top Feed, 4-Pipe, Vertical Headers

FIGURE 17

Controlled Pressure Receiver (CPR) Top Feed
4-Pipe Hot Gas Defrost
Vertical Headers
1-Pass Pan Loop

STRAINER
CHECK VALVE
GLOBE VALVE
SOLENOID VALVE
GAS POWERED SUCTION STOP VALVE
HAND EXPANSION VALVE
SIGHT GLASS

HGD HOT GAS DEFROST SUPPLY
LTRS LOW-TEMP RECIRCULATED SUCTION
LTRL LOW-TEMP RECIRCULATED LIQUID
HOT GAS FLOW
SATURATED LIQUID FLOW
SATURATED LIQUID & VAPOR FLOW
3.8. Figure 18: Top Feed, 4-Pipe, Horizontal Headers

FIGURE 18

Controlled Pressure Receiver (CPR) Top Feed
4-Pipe Hot Gas Defrost
Horizontal Headers
1-Pass Pan Loop

STRAINER  HGD  HOT GAS DEFROST SUPPLY
CHECK VALVE  LTRS  LOW-TEMP RECIRCULATED SUCTION
GLOBE VALVE  LTRL  LOW-TEMP RECIRCULATED LIQUID
SOLENOID VALVE
GAS POWERED SUCTION STOP VALVE
HAND EXPANSION VALVE
SIGHT GLASS

SATURATED LIQUID FLOW
SATURATED LIQUID & VAPOR FLOW
4. DIRECT EXPANSION (DX)

4.1. Figure 19: 3-Pipe, Separate Condensate Return, Vertical Header

FIGURE 19

Direct Expansion (DX)
3-Pipe Hot Gas Defrost
Separate Condensate Return
Vertical Header
2-Pass Pan Loop

STRAINER
CHECK VALVE
GLOBE VALVE
SOLENOID VALVE
DEFROST PRESSURE REGULATOR
GAS POWERED SUCTION STOP VALVE
HAND EXPANSION VALVE
ELECTRONIC EXPANSION VALVE
SIGHT GLASS

HGD HOT GAS DEFROST SUPPLY
LTS LOW-TEMP SUCTION
LTSCL LOW-TEMP SUB-COOLED LIQUID
DCR DEFROST CONDENSATE RETURN
HOT GAS FLOW
SATURATED LIQUID FLOW
SATURATED LIQUID & VAPOR FLOW
LIQUID LINE SOLENOID
4.2. Figure 20: 3-Pipe, Liquid Line Condensate Return, Vertical Headers

FIGURE 20

Direct Expansion (DX)
3-Pipe Hot Gas Defrost
Liquid Line Condensate Return
Vertical Header
2-Pass Pan Loop

![Diagram of 3-Pipe, Liquid Line Condensate Return, Vertical Headers]

- STRAINER
- CHECK VALVE
- GLOBE VALVE
- SOLENOID VALVE
- DEFROST PRESSURE REGULATOR
- GAS POWERED SUCTION STOP VALVE
- HAND EXPANSION VALVE
- ELECTRONIC EXPANSION VALVE
- SIGHT GLASS
- AUTO GAS VENT

HGD  HOT GAS DEFROST SUPPLY
LTS  LOW-TEMP SUCTION
LTSCL  LOW-TEMP SUB-COOLED LIQUID
HOT GAS FLOW
SATURATED LIQUID FLOW
SATURATED LIQUID & VAPOR FLOW
LIQUID LINE SOLENOID
5. GRAVITY FLOODED

5.1. Figure 21: 3-Pipe, Vertical Headers

**FIGURE 21**

Gravity Flooded
3-Pipe Hot Gas Defrost
Vertical Header
2-Pass Pan Loop

---

**Legend:**

- **STRAINER**
- **CHECK VALVE**
- **GLOBE VALVE**
- **SOLENOID VALVE**
- **DEFROST PRESSURE REGULATOR**
- **GAS POWERED SUCTION STOP VALVE**
- **HAND EXPANSION VALVE**
- **DRAINER**
- **LIQUID LEVEL SWITCH**
- **HGD** HOT GAS DEFROST SUPPLY
- **LTS** LOW-TEMP SUCTION
- **LTL** LOW-TEMP LIQUID
- **HOT GAS FLOW**
- **SATURATED LIQUID FLOW**
- **SATURATED LIQUID & VAPOR FLOW**