

**LEGEND**

|           |                         |             |
|-----------|-------------------------|-------------|
| 1         | ISSUED FOR CONSTRUCTION | 30-JUN-2017 |
| 0         | ISSUED FOR REVIEW       | 28-APR-2017 |
| revisions | description             | date        |

|   |                      |   |
|---|----------------------|---|
| A | detail no.           | A |
| C | location drawing no. | B |
|   | our design no.       | C |
|   | design no.           |   |

project  
**NHRC MECHANICAL UPGRADES BOILERS REPLACEMENT**  
 NATIONAL HYDROLOGY RESEARCH CENTRE  
 11 INNOVATION BOULEVARD  
 SASKATOON, SASKATCHEWAN

drawing  
**MECHANICAL SCHEDULES AND DETAILS**  
 design

Designed By  
 MCG  
 Date 2017/04/28  
 Conçu par  
 MCG  
 Date 2017/04/28  
 (yyyy/mm/dd)

Drawn By  
 MCG  
 Date 2017/04/28  
 Dessiné par  
 MCG  
 Date 2017/04/28  
 (yyyy/mm/dd)

Reviewed By  
 DHT  
 Date 2017/06/19  
 Examiné par  
 DHT  
 Date 2017/06/19  
 (yyyy/mm/dd)

Approved By  
 DHT  
 Date 2017/06/23  
 Approuvé par  
 DHT  
 Date 2017/06/23  
 (yyyy/mm/dd)

Tender  
 NIKOLAS FEHR  
 Project Manager  
 Administrateur de projets

EC Proj no.  
**NHRC-010**  
 Consultant Proj no.  
**16131**

Drawing no.  
**M13**  
 No. du dessin

| DOMESTIC WATER HEATING EQUIPMENT SCHEDULE |          |             |             |            |                 |                 |                |            |                          |             |       |        |            |
|-------------------------------------------|----------|-------------|-------------|------------|-----------------|-----------------|----------------|------------|--------------------------|-------------|-------|--------|------------|
| TAG                                       | LOCATION |             | HEATER DATA |            |                 |                 | STORAGE VOLUME |            | PHYSICAL CHARACTERISTICS |             | NOTES |        |            |
|                                           | ROOM     | DESCRIPTION | ENERGY TYPE | INPUT (kW) | TEMP. RISE (°C) | TEMP. RISE (°F) | (Litres)       | (U.S. Gal) | ASME RATED               | WEIGHT (kg) |       | (lbs.) |            |
| DHW-1                                     | 2670     | BOILER ROOM | NATURAL GAS | 117        | 399,000.0       | 77.8            | 140            | 492        | 130                      | YES         | 400   | 880    | 1, 2, 3, 4 |
| DHW-2                                     | 2670     | BOILER ROOM | NATURAL GAS | 117        | 399,000.0       | 77.8            | 140            | 492        | 130                      | YES         | 400   | 880    | 1, 2, 3, 4 |

NOTES:  
 1. COMPLETE WITH CSA RATED TAP RELIEF VALVE.  
 2. WITH 120V/1PHASE/60HZ, LESS THAN 11 AMPS.  
 3. HIGH OR LOW WATER PRESSURE CONTROL.  
 4. CONDENSATE LINE WITH NEUTRALIZER.

| GAS TO STEAM HUMIDIFIER SCHEDULE |                      |          |                     |                    |           |                     |         |            |                          |        |       |
|----------------------------------|----------------------|----------|---------------------|--------------------|-----------|---------------------|---------|------------|--------------------------|--------|-------|
| TAG                              | SERVES               | LOCATION |                     | HUMIDIFIER DATA    |           |                     |         | ASME RATED | PHYSICAL CHARACTERISTICS |        | NOTES |
|                                  |                      | ROOM     | DESCRIPTION         | MAXIMUM INPUT (kW) | BTU/h     | STEAM OUTPUT (kg/h) | (lb./h) |            | WEIGHT (kg)              | (lbs.) |       |
| H-1                              | SUPPLY FAN #5        | 3000     | FAN ROOM            | 163.5              | 558,000.0 | 204.1               | 450     | 1, 2, 3    |                          |        |       |
| H-2                              | SUPPLY FAN #5        | 3000     | FAN ROOM            | 163.5              | 558,000.0 | 204.1               | 450     | 1, 2, 3    |                          |        |       |
| H-3                              | SUPPLY FAN #1        | 3000     | FAN ROOM            | 163.5              | 558,000.0 | 204.1               | 450     | 1, 2, 3    |                          |        |       |
| H-4                              | SUPPLY FAN #1        | 3000     | FAN ROOM            | 109.0              | 372,000.0 | 136.1               | 300     | 1, 2, 3    |                          |        |       |
| H-5                              | SUPPLY FAN #3        | 3000     | FAN ROOM            | 109.0              | 372,000.0 | 136.1               | 300     | 1, 2, 3    |                          |        |       |
| H-6                              | SUPPLY FAN #26       | 3000     | FAN ROOM            | 18.2               | 62,000.0  | 22.7                | 50      | 1, 2, 3    |                          |        |       |
| H-7                              | SUPPLY FAN #12 & #17 | 2640A    | NEW MECHANICAL ROOM | 36.3               | 124,000.0 | 45.4                | 100     | 1, 2, 3    |                          |        |       |

NOTES:  
 1. PROVIDE SHORT ABSORPTION MANIFOLD AS PER MANUFACTURER'S RECOMMENDATION  
 2. 120V/1 Phase  
 3. NATURAL GAS

| EXPANSION TANK SCHEDULE |          |             |             |                      |                            |                           |                               |                  |            |       |     |     |     |   |
|-------------------------|----------|-------------|-------------|----------------------|----------------------------|---------------------------|-------------------------------|------------------|------------|-------|-----|-----|-----|---|
| TAG                     | LOCATION | ROOM        | DESCRIPTION | TANK VOLUME (Litres) | ACCEPTANCE VOLUME (Litres) | PRE-CHARGE PRESSURE (kPa) | MAXIMUM RATED CHARACTERISTICS |                  | ASME RATED | NOTES |     |     |     |   |
|                         |          |             |             |                      |                            |                           | TEMPERATURE (°C)              | TEMPERATURE (°F) |            |       |     |     |     |   |
| ET-1                    | 2670     | BOILER ROOM | 1999        | 528.0                | 1999                       | 528.0                     | 83                            | 125              | 115.6      | 240.0 | 862 | 125 | YES | 1 |

NOTES:  
 1. APPROVED MANUFACTURERS: BELL & GOSSETT, TACO, AMTROL

| PUMP SCHEDULE |                   |       |                |          |             |           |       |       |          |       |        |         |
|---------------|-------------------|-------|----------------|----------|-------------|-----------|-------|-------|----------|-------|--------|---------|
| TAG           | MODEL             | SIZE  | MANUFACTURER   | LOCATION |             | FLOW RATE |       | HEAD  |          | MOTOR |        | NOTES   |
|               |                   |       |                | ROOM     | DESCRIPTION | (L/s)     | (gpm) | (kPa) | (ft. WC) | (kW)  | (H.P.) |         |
| P-1           | Series e-1510 4BD | 215 T | BELL & GOSSETT | 2670     | BOILER ROOM | 31.55     | 500   | 149   | 50       | 7.46  | 10.00  | 1, 2, 5 |
| P-2           | Series e-1510 4BD | 215 T | BELL & GOSSETT | 2670     | BOILER ROOM | 31.55     | 500   | 149   | 50       | 7.46  | 10.00  | 1, 2, 5 |
| P-13          | Magna 3           | 32-60 | GRUNDFOS       | 2670     | BOILER ROOM | 0.82      | 13    | 45    | 15       | 0.11  | 0.15   | 3, 4, 5 |
| P-23          | Series e-1510 2BD | 182 T | BELL & GOSSETT | 2670     | BOILER ROOM | 7.89      | 125   | 149   | 50       | 2.24  | 3.00   | 1, 2, 5 |
| P-24          | Series e-1510 2BD | 182 T | BELL & GOSSETT | 2670     | BOILER ROOM | 7.89      | 125   | 149   | 50       | 2.24  | 3.00   | 1, 2, 5 |

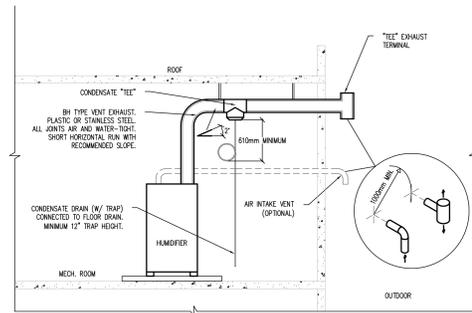
NOTES:  
 1. WITH 600V/3PHASE  
 2. WITH U.S. MOTORS ODP NEMA PREMIUM EFFICIENT INVERTER DUTY AND VFD  
 3. WITH 230V/1PHASE  
 4. WITH PERMANENT MAGNET MOTOR AND INTEGRATED FREQUENCY CONVERTER  
 5. APPROVED MANUFACTURERS: BELL & GOSSETT, GRUNDFOS, TACO

| HOT WATER BOILER SCHEDULE (Based on Cleaver Brooks) |           |          |             |                     |            |                   |                 |                          |        |       |        |            |
|-----------------------------------------------------|-----------|----------|-------------|---------------------|------------|-------------------|-----------------|--------------------------|--------|-------|--------|------------|
| TAG                                                 | MODEL     | LOCATION |             | HEATING PERFORMANCE |            |                   |                 | PHYSICAL CHARACTERISTICS |        | NOTES |        |            |
|                                                     |           | ROOM     | DESCRIPTION | ENERGY TYPE         | INPUT (kW) | MAX. OUTPUT (MBH) | BURNER TURNDOWN | WEIGHT (kg)              | (lbs.) |       |        |            |
| B-1                                                 | CFLC 4000 | 2670     | BOILER ROOM | NAT. GAS            | 1,172.3    | 4,000.0           | 1,102.0         | 3,760.0                  | 5:1    | 4,883 | 10,743 | 1, 2, 3, 4 |
| B-2                                                 | CFLC 4000 | 2670     | BOILER ROOM | NAT. GAS            | 1,172.3    | 4,000.0           | 1,102.0         | 3,760.0                  | 5:1    | 4,883 | 10,743 | 1, 2, 3, 4 |
| B-3                                                 | CFLC 4000 | 2670     | BOILER ROOM | NAT. GAS            | 1,172.3    | 4,000.0           | 1,102.0         | 3,760.0                  | 5:1    | 4,883 | 10,743 | 1, 2, 3, 4 |

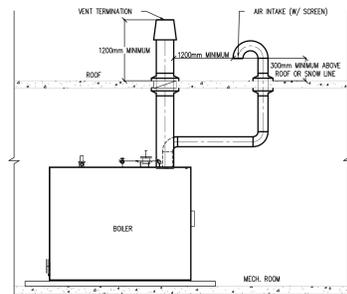
NOTES:  
 1. COMPLETE WITH 1-1/4" NPT. PVC PIPE CONNECTED TO CONDENSATE NEUTRALIZATION TANK  
 2. WITH 600V/3 PHASE  
 3. APPROVED MANUFACTURERS: CLEAVER BROOKS, VISSMAN, BOSCH  
 4. MAXIMUM HEIGHT = 2450 mm. COORDINATE EQUIPMENT HEIGHT AND PIPING POSITION.

| AIR SEPARATOR SCHEDULE |      |             |          |                        |                                     |             |       |          |        |            |                |       |       |
|------------------------|------|-------------|----------|------------------------|-------------------------------------|-------------|-------|----------|--------|------------|----------------|-------|-------|
| TAG                    | ROOM | DESCRIPTION | LOCATION | MAXIMUM CAPACITY (L/s) | MAXIMUM RATED CHARACTERISTICS (gpm) | TEMPERATURE |       | PRESSURE |        | ASME RATED | APPROX. VOLUME |       | NOTES |
|                        |      |             |          |                        |                                     | (°C)        | (°F)  | (kPa)    | (PSIG) |            | (L)            | (gal) |       |
| AS-1                   | 2670 | BOILER ROOM |          | 54                     | 850                                 | 176.7       | 350.0 | 862      | 125    | YES        | 129            | 34    | 1     |

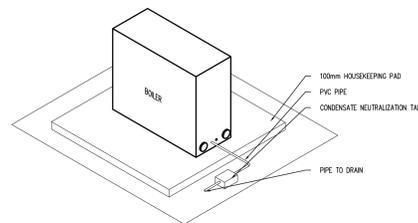
NOTES:  
 1. APPROVED MANUFACTURERS: BELL & GOSSETT, TACO, AMTROL



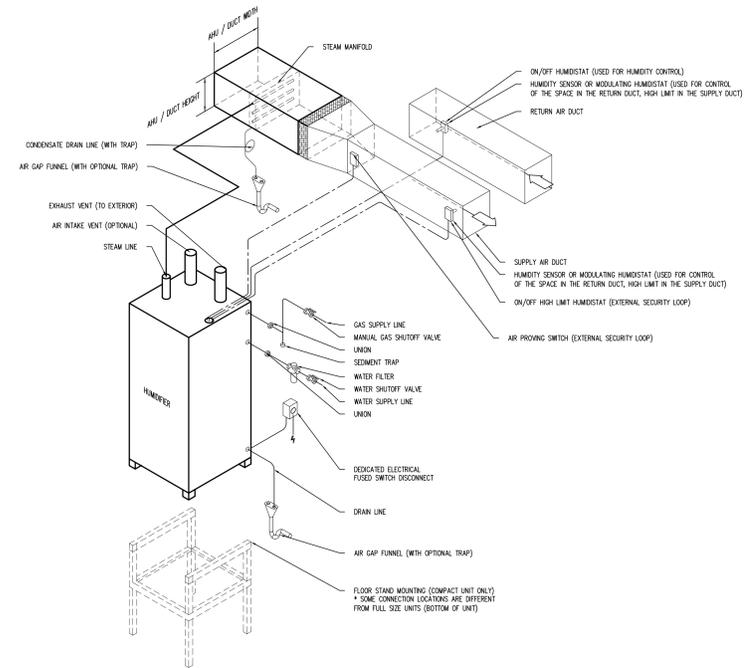
1 EXHAUST VENT DETAIL - HUMIDIFIER  
 M13 N.T.S.



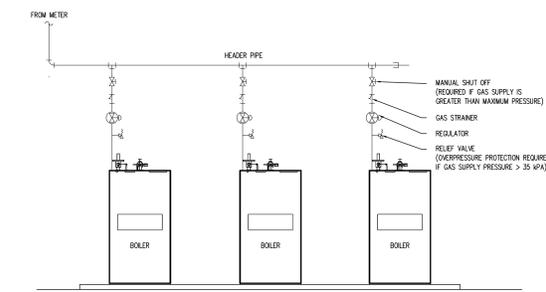
3 EXHAUST VENT AND AIR INTAKE DETAIL - BOILER  
 M13 N.T.S.



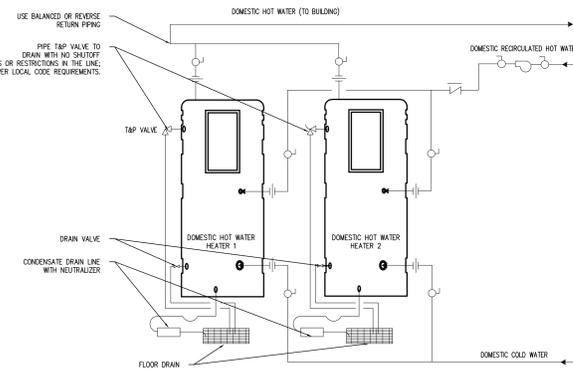
4 CONDENSATE NEUTRALIZATION TANK DETAIL - BOILER  
 M13 N.T.S.



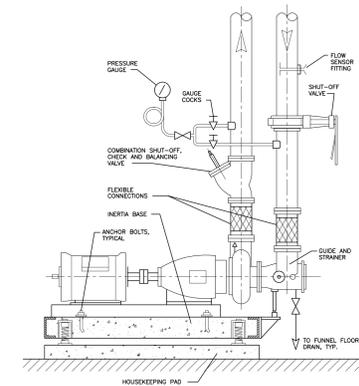
2 TYPICAL CONNECTIONS - HUMIDIFIER  
 M13 N.T.S.



5 GAS CONNECTIONS DETAIL - BOILER  
 M13 N.T.S.



6 TYPICAL CONNECTIONS - DOMESTIC HOT WATER HEATER  
 M13 N.T.S.



7 BASE MOUNTED PUMP  
 M13 N.T.S.