**This Prefunctional Checklist should be completed as part of startup and initial checkout of the equipment in preparation for Functional Performance testing.**

|  |  |
| --- | --- |
| PC: | **23 81 26** |
| **ITEM:** | **Split System AHU** |
| **ID:** |  |
| **AREA SERVED:** |  |

Form Filled Out By:

|  |  |  |
| --- | --- | --- |
|  | Name & Company | Date |
| GC |  |  |
| MC |  |  |
| EC |  |  |
| BC |  |  |
| CC |  |  |
| OR |  |  |
| A/E |  |  |
| CA |  |  |

GC = General Contractor; MC = Mechanical Contractor; EC = Electrical Contractor; RMCS = Refrigerant Management Control System Contractor, OR = Owner Representative; A/E = Architect/Engineer; CA = Commissioning Agent

XX = No Initials Required

# DOCUMENTATION VERIFICATION

Check if OK. Enter note number if deficient.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Item** | **GC** | **MC** | **EC** | **RMCS** | **OR** | **A/E** | **CA** |
| Product information submitted |  |  |  |  |  |  |  |
| Shop drawings submitted |  |  |  |  |  |  |  |
| Manufacturer’s installation instructions submitted |  |  |  |  |  |  |  |

# MODEL VERIFICATION

Fill in requested information.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Specified | **Submitted** | **Installed** |
| Manufacturer |  |  |  |
| Model Number |  |  |  |
| Mark No |  |  |  |
| Design CFM |  |  |  |
| Volts |  |  |  |
| Amps |  |  |  |
| MAX FUSE AMPS (MFA) OR CIRCUIT BREAKER SIZE |  |  |  |
| Refrigerant Type |  |  |  |

# INSTALLATION VERIFICATION

This checklist does not take the place of the manufacturer’s recommended checkout and startup procedures or report**.**

Check if OK. Enter Outstanding Item Note number if deficient.

| **No** | **Checks** | **GC** | **MC** | **EC** | **RMCS** | **OR** | **A/E** | **CA** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | Verify there is no damage to the unit. No dents, scratches, etc |  |  |  |  |  |  |  |
| 2 | Unit is mounted on a flat and level surface? Shims may be needed at one or more points along the length of the rails to prevent distortion or sagging of the support rails. |  |  |  |  |  |  |  |
| 3 | Maintenance access acceptable for unit and components? Doors open fully, giving adequate access for routine maintenance, motor, fan, and coil replacement |  |  |  |  |  |  |  |
| 4 | Verify there is at least 54" of clearance in front of electrical power devices? (Starters, VFDs, Disconnect Switches, etc.) |  |  |  |  |  |  |  |
| 5 | Inspect the interior of the unit. Verify there is no damage present at the coils, dampers, and fan area |  |  |  |  |  |  |  |
| 6 | Check all field mounted junction boxes and other field mounted components. Make sure self-tapping drill screws ARE NOT USED. Self tapping screws will not tighten nor secure properly and panel damage can occur. Pop rivets or bolts with flat washer should be used instead of self tapping screws |  |  |  |  |  |  |  |
| 7 | All penetrations into the unit have been permanently sealed using an industrial/commercial grade silicone sealant or duct seal compound |  |  |  |  |  |  |  |
| 8 | All filters are in place securely with no air bypassing the filters. (Pre-Filters = Merv 8, Final Filters = Merv 14) |  |  |  |  |  |  |  |
| 9 | Make sure all construction debris is removed and filters are clean |  |  |  |  |  |  |  |
| 10 | Verify all shipping brackets and tie-down bolts have been removed before starting the unit |  |  |  |  |  |  |  |
| 11 | Before start up - hand rotate the fan wheel to verify fan clears the fan inlet cone and housing |  |  |  |  |  |  |  |
| 12 | All sections of the unit fit together properly and are sealed? Check for air leaks at splice joints where two sections are joined together. |  |  |  |  |  |  |  |
| 13 | Check for air leakage at unit connections and around doors. Verify there is no air leakage |  |  |  |  |  |  |  |
| 14 | No leaking around pipe fittings |  |  |  |  |  |  |  |
| 15 | Piping is properly supported independent of the coil |  |  |  |  |  |  |  |
| 16 | All coils and fins are in good condition and clean |  |  |  |  |  |  |  |
| 17 | All valves are operational and accessible |  |  |  |  |  |  |  |
| 18 | Drain lines and traps are full size from the drain pan connection. |  |  |  |  |  |  |  |
| 19 | No apparent severe airflow restrictions due to extreme changes in size or direction in the ductwork |  |  |  |  |  |  |  |
| 20 | Ductwork is properly supported |  |  |  |  |  |  |  |
| 21 | Disconnect switch properly activates and deactivates the unit's fans |  |  |  |  |  |  |  |
| 22 | Bump the supply fans to verify correct rotation |  |  |  |  |  |  |  |
| **CONDENSING UNIT** | | | | | | | | |
| 1 | Is the unit in good condition? There should be no dents, dings, or scratches |  |  |  |  |  |  |  |
| 2 | The unit is installed on a strong foundation that is stable enough to support the units weight? |  |  |  |  |  |  |  |
| 3 | The unit is installed level? |  |  |  |  |  |  |  |
| 4 | Verify there are no obstructions above the unit that would deflect discharge air downward where it could be recirculated back to the inlet of the condenser coil |  |  |  |  |  |  |  |
| 5 | Verify proper service access is provided to the compressors, electrical control panel, and piping components. (Refer to IOM manual for exact clearances. In general: 6ft minimum clearance around the unit) |  |  |  |  |  |  |  |
| 6 | Verify there is no debris accumulated near the unit where it could be drawn into the condenser coil. |  |  |  |  |  |  |  |
| 7 | Manually rotate all fans and verify that they rotate freely |  |  |  |  |  |  |  |
| 8 | Verify that all setscrews and fasteners on the fan assemblies are tight |  |  |  |  |  |  |  |
| 9 | Inspect the coils and fins. Verify they are clean and in good condition with no damage present. |  |  |  |  |  |  |  |
| 10 | The unit ships with a nitrogen holding charge. At the time the unit is received, Visually inspect the unit piping and make sure no breakage has occurred and that the fittings did not loosen during shipping. |  |  |  |  |  |  |  |
| 11 | Before connecting the unit to the piping system - Check the pressure of the unit. The unit should be positive pressure If no pressure is evident, the unit must be leak tested and the leak repaired. |  |  |  |  |  |  |  |
| 12 | After determining there are no refrigerant leaks, evacuate the system by triple evacuation method. |  |  |  |  |  |  |  |
| 13 | After evacuation - The system has been charged with the refrigerant in a liquid state as described in the IOM manual. |  |  |  |  |  |  |  |
| 14 | Verify the sensing bulb of the expansion valve is installed in the closest straight and horizontal run of suction line from the evaporator. |  |  |  |  |  |  |  |
| 15 | Make sure the sensing bulb is securely fastened to the suction line and is insulated to reduce the effect of the surrounding ambient temperature. |  |  |  |  |  |  |  |
| 16 | For field refrigerant piping - Verify the correct type of piping is used. Types L & K are approved for ACR applications. No Type M piping is to be used because the walls of this piping is too thin. |  |  |  |  |  |  |  |
| 17 | Verify all joints are **brazed** with oxy-acetylene torches. With no leaks present |  |  |  |  |  |  |  |
| 18 | Verify the suction line is insulated to reduce excessive superheat buildup. |  |  |  |  |  |  |  |
| 19 | Verify the liquid line is insulated to prevent loss of subcooling and liquid flashing. |  |  |  |  |  |  |  |
| 20 | Is a filter drier installed in the liquid line? The filter drier removes debris from the liquid refrigerant and contains a desiccant to absorb moisture in the system. |  |  |  |  |  |  |  |
| 21 | Verify a sight glass is installed in the liquid line close to the TX valve and it is easily visible to see the condition of the refrigerant |  |  |  |  |  |  |  |
| 22 | Verify solenoid valves are installed as needed to isolate refrigerant circuits |  |  |  |  |  |  |  |
| 23 | Verify horizontal runs of refrigerant lines are sloped 1" in 10 feet in the direction of refrigerant flow to assist in oil return |  |  |  |  |  |  |  |
| 24 | Check all refrigerant lines to see that they will not vibrate against each other or against other unit components. Make sure all piping is properly secured and supported |  |  |  |  |  |  |  |
| 25 | Verify all nameplate electrical data is compatible with the available power supply |  |  |  |  |  |  |  |
| 26 | Verify a factory mounted disconnect switch is located within sight of the unit and is accessible. |  |  |  |  |  |  |  |
| 27 | Verify an electrically isolated 115V circuit is provided in the unit to supply the factory mounted service receptacle outlet |  |  |  |  |  |  |  |
| 28 | Verify all electrical terminations in the unit control panel and compressor terminal box are tight and secure |  |  |  |  |  |  |  |
| 29 | All control components are installed as needed to relay data to the automation system |  |  |  |  |  |  |  |
| 30 | Verify that all refrigerant valves are either open or closed as required for proper operation of the unit. |  |  |  |  |  |  |  |
| 31 | Before starting the unit - Check at the power block or disconnect for the proper voltage and for the proper voltage between phases. |  |  |  |  |  |  |  |
| 32 | Before starting the unit - Check power for proper phasing using a phase sequence meter. |  |  |  |  |  |  |  |
| 33 | Before starting the unit - Check the compressor oil level. Verify the oil level is at or slightly above the center of the sight glass |  |  |  |  |  |  |  |
| 34 | Are compressors rotating in the proper direction |  |  |  |  |  |  |  |
| 35 | With the compressors energized - Verify the suction pressure drops and the discharge pressure rises. This confirms the compressor rotation is correct. |  |  |  |  |  |  |  |
| 36 | Verify each condenser fan has the correct rotation |  |  |  |  |  |  |  |
| 37 | Verify crankcase heaters are enabled and operating 24 hours before starting the compressors |  |  |  |  |  |  |  |
| 38 | With the Unit refrigerant charge correct, the liquid line sight glass full with no bubbles, and at full load conditions - Verify the superheat setting is between 8 and 14 degrees F. |  |  |  |  |  |  |  |
| 39 | On refrigeration circuits with multiple expansion valves - Verify the superheat adjustment is approximately the same for all valves in the circuit |  |  |  |  |  |  |  |
| 40 | After 15 minutes of unit run time - Check the oil level in the compressor sightglass. Verify proper oil level is present. Check oil level again after compressors have shut down. |  |  |  |  |  |  |  |
| 41 | To minimize compressor cycling, Make sure a three minute anti-cycling timer is included in the control logic. Three minutes in the minimum time. |  |  |  |  |  |  |  |
| 42 | Measure and Record **voltage** across each phase. L1 to L2:\_\_\_\_\_\_\_\_\_\_\_\_ L2 to L3:\_\_\_\_\_\_\_\_\_\_\_\_ L3 to L1:\_\_\_\_\_\_\_\_\_\_\_\_. Verify the phase voltage imbalance is no greater than 10% |  |  |  |  |  |  |  |
| 43 | Measure and Record **Amperage** across each phase of fully loaded. **Compressor 1**  L1 to L2:\_\_\_\_\_\_\_\_\_\_\_\_ L2 to L3:\_\_\_\_\_\_\_\_\_\_\_\_ L3 to L1:\_\_\_\_\_\_\_\_\_\_\_\_ Make sure measured amps do not exceed nameplate values. |  |  |  |  |  |  |  |
| 44 | Are there any unusual noises or vibrations with the system in operation? |  |  |  |  |  |  |  |

# OUTSTANDING ITEMS

Note outstanding items in table below. Use numbers referenced above.

|  |  |  |
| --- | --- | --- |
| Resolved (Initial / Date) | **Note** | Description |
|  | **1.** |  |
|  | **2.** |  |
|  | **3.** |  |
|  | **4.** |  |
|  | **5.** |  |
|  | **6.** |  |
|  | **7.** |  |
|  | **8.** |  |
|  | **9.** |  |
|  | **10.** |  |

# FIELD NOTES

Fill in as appropriate.

|  |
| --- |
|  |
|  |
|  |
|  |
|  |

# SIGN OFF

System / Equipment have been installed in accordance with the Contract Documents and are ready for Functional Testing.

|  |  |  |
| --- | --- | --- |
|  | **Signature** | **Date** |
| **Contractor’s Representative** |  |  |
| **A /E Representative** |  |  |
| **Commissioning Agent** |  |  |
| **Owner’s Representative** |  |  |

##### END OF CHECKLIST