

1329 E. Kemper Rd, Ste 4210
Cincinnati, OH 45246
Phone 513-860-2050

Shake Shack – McKinney, TX Commissioning Plan & Procedures

SCOPE OF WORK:

National TAB will be responsible to manage all Commissioning activities for the following disciplines:

- HVAC Systems (Air & Hydronics)
- Controls System (Temperature)
- Domestic Cold, Hot, & Hot Water Return System
- Gas Pipe
- Sanitary, Waste, Vent and Drain Lines
- Electrical
- Lighting

Our team will review job specifications & plans to develop the commissioning process & criteria for the disciplines outlined for review & input from design & construction teams. The criteria will consist of the following:

1. Work with the construction team to develop a working schedule for each of the commissioning processes in relationship with the actual construction schedule.
2. Provide direction and support to use the FaciliBuild HUB Digital Platform (IOS and Android application), National TAB will utilize to provide easy access to perform each onsite commissioning task. The platform allows our team and other trade team members to have access to:
 - a. Portal to all team members for easy access to contact info & who's who.
 - b. Organized area for all related files & documents in respect to commissioning
 - c. Digital Checklist that are critical to the commissioning process to document pass/fail test data and visual validation. The Checklist module is where all FIV, OPT, & FPT tests for each commissioning activity.
 - d. Field Issues/RFI module that can be assigned to the required team member to address.
 - e. Provide final digital and hard copy reports of specific commissioning activity immediately & a final complete report at the end of the project.
3. An introduction of the commissioning process to lead team member for each discipline stated above for coordination & review of the commissioning process for their specific discipline. The commissioning team will work with each member individually to gather input & expertise of each trade discipline to finalize all field checklists with respect to assets/systems provided and current construction conditions.
4. Each discipline commissioned will consist of a commissioning procedure that includes the activities to be performed. The commissioning team will provide notice prior to any test of the participants required during each of the commissioning processes. Construction team shall ensure all manufacturer's submittals, construction team contacts, design documents shall be made available for review to assist in the commissioning procedure.

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development. A review of the commissioning plan shall be performed by all involved trades to ensure their role in the process and to verify that no specific test points are left out of functional testing.

5. Preliminary Pre-Commissioning walk-through: NT Commissioning team will schedule a walk through with each trade to conduct a preliminary inspection prior to final testing. The walk-through will validate installation is complete and proper, power supply, control wiring along with normal and abnormal interlocks. Any failed observations will require immediate resolution prior to commencing OPT and FPT testing.
6. Document & perform or witness Functional Installation Verifications (FIV), Operational Performance Test (OPT), and Functional Performance Test (FPT) for each system or asset being commissioned. FIV consist of the inspection of the installation of assets and systems. OPT are operational inspections and in most cases are the asset startup reports performed by the associated trade or manufacture. FPT are the critical point to point testing of each system input vs output. FPT also ensures there is a positive relationship and cohesiveness between each associated system and the building itself which will enturn provide a healthy building with comfort under control.
7. Reporting of deficiencies & documentation of walk-throughs, pass-fail testing shall be provided immediately to the team with action steps needed from the team to facilitate additional testing if required.
8. Final digital & hard copy Commissioning report shall be submitted to team with the following, but not limited, to an executive summary, completed walk-through & testing checklist, and functional pass/fail reports. Other required trades must also include all TAB reports, DALT testing reports, specific equipment & manufacturers startups & warranty documents to be included in the report as references to the final Commissioning documentation.

Commissioning Management Team & Responsibilities for key team members

Dan Hertenstein, NEBB Professional will manage the overall commissioning process. Provide technical expertise to carry out the commissioning plan and assist entire team to a positive solutions for any issues that arrive. Dan will also provide periodic summary of completed work, modification of commissioning schedule, changes to any testing criteria, manage team work plan.

Will Turnbough, NEBB Professional will assist Dan in management of the commissioning process, and review the TAB reports.

Titus Mowry (BS-Engineering), Will pefrom on-site commissioning test completing the required checklist, and assign issues to team members as they are discovered.

Brian Turnbough: Will lead the communication plan to ensure team members have access to our platform and assist our internal & external teams with the collaboration and ensure all activites are performed in a timely and expedient manner.

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Brianna Biggs, Will maintain all required documentation which consist of but not limited to ensuring commissioning team has the latest documentations for each discipline,

External Team Members

Design Team Members, shall be available to communicate electronically or verbally on a as needed basis to provide clarity of design intent and assist with commissioning issues

General Contractor & PM's, Ensure the integration and development of all construction schedules with commissioning schedules. Keeps commissioning informed of completion of specific assets or system in a timely fashion to allow the commissioning team to schedule with trades for task required. Ensure all trades provide proper startup documents. Ensure that all trades and the commissioning teams are communicating properly for a successful outcome.

Site Trades (MC, EC, TAB, PC, SPECIALTY), Must perform or assist in all FIV, OPT, FPT developed for their respective trade. Attend meetings and assist of resolution of any issues until satisfactory. Support the GC & Commissioning team of proper timing of commissioning activities required. Each trade shall review initial site checklist with commissioning team to ensure proper testing parameters are selected are feasible based upon design & current construction conditions. Controls & Fire Systems will be required to provide documentation of point-to-point test that systems are communicating and trend logs during FPT testings as needed by all team members.

Various external team members will be requested to witness of critical FPT testing which would consist the trade discipline, commissioning member, general contractors project manager, and possibly a member of design team when need to ensure FPT is meeting the design SOO and parameters.

Several FIV & OPT may refer to previous Installation Validation reports provided or startup reports performed by trades/GC of various assets or systems prior to the commissioning mobilization to the site or deemed simplicity in nature with no controls or critical sequencing.

HVAC Commissioning Discipline Procedures:

The mechanical system commissioning will encompass the Mechanical, TAB, Controls, Electrician, and Plumbing contractors to assist when needed on all site walk-thru and testing. All check-out startup documents are required prior to commencing on various OPT & all FPT Test. The lead for the mechanical contractor shall provide insight & direction of testing points to the commissioning team. Several of the static testing such as Pipe pressure, flushing test, and any refrigerant pressure or evac test are documented and witness by site trades and not necessarily a commissioning team members. Any of these test performed must be provided to the commissioning to include in final reports and ensure the ability of performing any OPT or FPT testing.

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HVAC Controls Commissioning Discipline Procedures:

The HVAC controls will be tested 100%. If any failures occur, the associated trades must resolve & be present for retesting of each previously failed test. Full-load, normal operation load conditions will be performed on all major HVAC assets. System-to-system interfacing relationships will be evaluated & tested in conjunction with building pressurization flow requirements. Test all Sequence Of Operations (SOO) to ensure they meet SOO specifications.

Prior to any functional testing and ideally before any programming of the controls has started it is HIGHLY advisable for the Controls Contractor, HVAC Contractor, Project Manager, MEP Design team, and Commissioning review the SOO and the intent of the controls contractor to make sure the end result will produce the required output during FPT testing. The controls must also be able to be programmed & written in a manner to ensure future facility teams can identify output points are in sync with nomenclature of design and/or as-built documents.

Perform FIV, OPT, FPT on the following assets and systems as follows:

- Each asset will have various Input & Output points tested along with the functionality of specific components of the asset.
- Controls setpoints and reaction time for desirable output
- VFD and other component commands such as On-Off output
- Verify schedules and setpoints are programmed (Occupied & Unoccupied times)
- Verification of proper location & functionality of all sensors such as temperature, humidity, current & pressurization type sensors
- Sequencing of individual components & complete systems
- Pressure & Temperature relationships with respect to space-to-space relationships and overall building performance.

Domestic Hot Water Piping Commissioning Discipline Procedures:

The team will commission the hot water systems including the piping and the water heating systems. Any flushing or piping pressure test shall be performed by the plumbing contractor and submit to the commissioning and general contractors teams. The plumbing contractor shall confirm completion of part of or whole system completion prior to any testing. Water heater startup reports must be submitted before functional testing. The FIV portion of the piping is walking the piping system to ensure proper location, tagging, and installation various valving, pipe routing & size with specified hangers and insulation. Most of the OPT testing is performed by the contractor to ensure system readiness. Final Functional test are performed on water heaters, pumps, control valves any any functionality of controls sequences, time integral and

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stability of output with respect to pressures and temperatures of the system. Plumbing systems are life-safety system and must be approved by the local authority having jurisdiction (AHJ).

Perform FIV, OPT, FPT on the following assets and systems as follows:

- Piping (Hot Water)
- Hangers & Insulation
- Water Heaters and/or Boilers
- Back Flow preventers & PRV(s)
- Cleanouts & Strainers
- Pumps
- Vents, shut off, mixing, & controls valves

Reporting

The final report will be submitted to entire team for review and historical value typically consist of:

1. Team members for all Design & Construction teams
2. Table of contents
3. Original scope and commissioning plan
4. Executive summary
5. Final resolved log issues with any open issues noted
6. Any accepted deviations to intent or commissioning from Construction & Design teams
7. Observation & witness reports
8. Any requested startup reports
9. All FIV, OPT, FPT checklist reports
10. Any system diagrams to show controls input-output responses
11. Any AHJ test sign-off documentations for life safety systems

The commissioning team will provide (5) separate reports to include HVAC & Controls combined report, Domestic Hot Water system report, Sanitary-Waste & Drains, Gas Lines, Electrical & Lighting.