# CORE Protection Fire System – Solid Fuel Application

TB20-1020

October 12, 2020 (updated)

## Application Background:

Solid Fuel cooking operations, where wood, charcoal, etc. are used as heat source, are becoming more common in commercial kitchens. They present a higher risk challenge for kitchen exhaust and fire protection systems when compared to traditional kitchen appliances. The increased hazard is due to elevated heat, the specific fuel source used, the ignition source and the types of emissions produced. NFPA 96 discusses solid fuel cooking stating that there are "increased quantities of carbon, creosote, and grease-laden vapors…that rapidly contaminate surfaces, produce airborne sparks and embers, and are subject to significant flare-ups." (NFPA 96 A.4.1.6) Recent evidence in the field supports these statements.

Solid Fuel cooking generates more effluent than normal cooking resulting in the presence of ash, grease, embers and creosote. Creosote is a highly flammable by-product of Solid Fuel cooking that has a low flash point, the temperature at which an ember or flame can ignite the fuel. Embers produced by Solid Fuel appliances can lead to potential fires if the entire system is not properly maintained; greater fire risk in the grease duct if cleaning is not done regularly. Solid Fuel appliances will stay at elevated temperatures even after cooking operations are complete; some Solid Fuel appliances are intentionally operated through the night without supervision.

Code defines solid fuel as, "any solid, organic, consumable fuel such as briquettes, mesquite, hardwood or charcoal" (NFPA 96 3.3.40). Solid fuel cooking is also classified as Extra Heavy Duty cooking and often has a hood and appliance rating of 700°F. The International Mechanical Code (IMC) requires that Extra Heavy Duty Solid Fuel equipment, because of the potential hazard, have a dedicated Type I Hood, Type I Grease Duct, Fire Suppression System and Exhaust Fan due to the elevated hazard potential. The use of CORE Fire Protection with self-cleaning controls is required for this application to help prevent the buildup of creosote and reduce the inherent risks with this type of appliance.

## Mandatory Product Requirements:

| PRODUCT | REASON FOR REQUIREMENT |
|---|---|
| CORE Fire Protection | CORE provides the necessary fire protection for this application, including electric detection, self-cleaning manifolds, unlimited supply of water and Overlapping Total Flood Appliance Protection |
| Self-Cleaning Controls | Self-Cleaning controls and piping automatically clean the hood plenum, back side of the grease filters, and the duct immediately downstream of the hood. Daily cleaning cycles reduced the fuel source in the hood and duct. |
| Proper Hood Design | Hoods must be 30 inches tall, with 24 inch front and side overhang. Wall Canopy Hood airflow must be 350-400 CFM/ft and 450-500 CFM/ft for solid fuel charbroilers over 4 feet in length. Island Hood airflow must be 500-550 CFM/ft.* Side overhangs should be maintained even with the inclusion of non-combustible walls or Wide Vertical End Panels. |
| Factory Installed Risers | The proper installation of the fire detector and duct nozzle in the riser is done at the factory; a controlled environment where the installation is verified and tested for proper operation. |
| Wide Vertical End Panels or Non-combustible Walls | Wide Vertical End Panels or Non-combustible walls ensure that flames will not spread from under the Hood to other hoods or surrounding areas. Wide Vertical End Panels will also help with hood capture and containment and appliance placement. When a solid fuel hood is utilized adjacent to a non-solid fuel type-1 hood, a wide vertical end panel is still suggested. |
| Downstream Duct Detector | Additional duct thermal detectors are required downstream in the ductwork, preferably under each exhaust fan inlet and also at the leaving end of any horizontal run exceeding 10' in length. These added detectors will detect fires that start in or move quickly into ducts above the detector placed in the factory installed hood exhaust riser. |
| Listed Ductwork | Round factory-built, listed Grease Duct has passed rigorous industry testing, undergoes dye testing to ensure no leaks, and is easier to clean. Field fabricated duct is prone to leaking, may interfere with self-cleaning functions and is more likely to have clearance to combustible violations. |
| Captrate Filtration | Captrate filters have a unique S-baffle construction, which offers the most effective grease extraction and spark arresting capabilities. Proper filtration reduces the buildup of fuel in the hood and duct system. |
| CASLink Controls | Remote and local monitoring of the commercial kitchen ventilation system. Monitors temperatures, status of fans and controllers, as well as offering 24/7 real time fire status for CORE Protection Fire System. |
| 600 Degree Fire Stats | 600 degree fire stats should be utilized for all solid fuel applications, including the duct riser sensor and any downstream detection. Recent data shows that these sensors have a reduced rate of rise sensitivity. |
| Pre-construction Service Trade Meeting | A pre-construction CASService visit is required to educate and inform all trades of the necessary requirements and critical elements in these high risk applications. |
| Steel Exhaust Fan with Steel Wheel (Utility Set) | Steel Wheels in Steel Exhaust Fans can withstand higher heat and grease emissions to help prevent fan failure in a fire event. Inline fans should be avoided. KB-inline is acceptable with engineering approval for sites when a utility set is not physically possible. |

**Lighter duty enclosed solid fuel applications may have exceptions regarding CFM/ft. Specific applications should be verified with Engineering.*

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**January 27, 2020 (updated)**

## Related Articles:

*Fire Risk from Solid Fuel Commercial Cooking* by Doug Horton
https://www.captiveaire.com/Resources/Articles/Fire_Risk_Solid_Fuel_Cooking_CSE_Article.pdf

Fuel to the Fire by Doug Horton
http://www.nfpa.org/newsandpublications/nfpa-journal/2015/july-august-2015/features/fuel-to-fire

*60 Years of Commercial Kitchen Fire Suppression* by Bill Griffin and Mike Morgan
https://www.captiveaire.com/Resources/Articles/Griffin_and_Morgan_CKV_Fire.pdf

*PROTECTING YOUR RESTAURANT: MINIMIZE SOLID FUEL COOKING RISKS by Society Insurance*
http://www.societyinsurance.com/assets/1/AssetManager/Solid%20Fuel%20White%20Paper.pdf

Best Practices for Safely Venting Solid Fuel by Merrill Bevan
http://woodstone-corp.com/wp-content/uploads/2012/03/fuel-venting-with-cover.pdf