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21st Century Chimney Sweep

6/30/2024 | 15 Photos



# 1223 Your St Chimney Report

## Summary

This report was created by Jason Clough, owner of 21st Century Chimney Sweep LLC. Jason has been working in the chimney industry since 2006 and has obtained many credentials including:

CSIA Certified Chimney Sweep #10210

NCSG Certified Chimney Professional #1420

NCSG Certified Chimney Reliner #384

NFI Woodburning Specialist #179817

- All pictures in the following report can be clicked for full size image. There are parts of every fireplace and chimney that are inaccessible for inspection without doing damage to the home. This inspection does not include areas that are inaccessible.
- Factory-built fireplaces and chimneys are typically made of a combination of light gauge galvanized steel and light gauge stainless steel, with some refractory panels in the firebox. Over time, these refractory panels may crack or deteriorate due to normal wear and tear. Galvanized steel is steel coated with a layer of zinc, which helps protect against corrosion. However, this zinc coating can be worn away by exposure to water and high heat, leading to corrosion of the steel beneath. Similarly, stainless steel may also be susceptible to corrosion if exposed to high heat, as its chemical composition can change under these conditions. In summary, factory-built fireplaces and chimneys do not last forever, as exposure to moisture and high heat can cause damage to the materials they are made of. It is possible to observe some degree of corrosion or changes to the materials, but it is commonly difficult to determine how much the structural integrity of the system has been compromised. It is important to periodically assess whether a factory-built fireplace or chimney is still suitable for use based on its original design and testing standards.
- The factory built fireplace system has had large amounts of water intrusion and has been damaged both inside and out. It is operationally deficient and potentially hazardous.
- Within the masonry system the cracking in the clay flue tile lining is consistent with thermal shock. Thermal shock happens when the inside of the tile is rapidly heated and expands faster than the outside of the tile, resulting in a vertical crack. Normal operation, and even over-firing, of the fireplace does not result in a rapid enough increase in heat to cause thermal shock. Thermal shock is typically associated with a chimney fire. A chimney fire is considered a sudden and accidental incident. There is substantial field evidence and some laboratory evidence that chimney fires can ignite and progress without ever developing the obvious signs associated with a free-burning fire. The reasons for and conditions necessary for such hidden fires are not well understood, partly because they may not be detected and observed while they are happening. Undoubtedly, they are related to the limiting but not total elimination of one or more of the vital elements of a fire: fuel,

oxygen, or heat. (Chimney Fires: Causes, Effects & Evaluation)

- Clearance to combustible materials is insufficient under the hearth extension and in the attic. When wood is exposed to heat pyrolysis occurs. Pyrolysis, or heat degradation, is a process by which the ignition temperature of wood is permanently reduced every time the wood gets hot. This literally means a structure fire becomes more likely to occur every time the fireplace is used.
- Instead of a proper crown, this chimney has a mortar wash which is very common in this area. This mortar wash does not allow for any expansion/contraction of the chimney, the flue or the wash itself. This leads to cracking resulting in water intrusion, which is also very common. The mortar wash does not overhang the brick/stone face of the chimney. Mortar is meant to bond masonry units together, not to stand alone. A proper crown is made of concrete. It does have a bond break between the crown and the chimney and an expansion joint between the crown and the flue/flues. It has an overhang and a drip edge which prevent water from streaming down the face of the chimney causing deterioration and water intrusion. The purpose of the chimney crown is to close off the space between the flue liner and chimney wall, to shed rainwater clear of the chimney, and generally to prevent the entry of moisture. Despite its importance to the integrity of the chimney, this is one feature that is neither well addressed in codes nor well-executed in the field. Failed or inadequate chimney crowns are among the more common causes of chimney deterioration. (Chimney Fires; Causes, Effects & Evaluation)



1 This is a factory built fireplace. It is intended to be a decorative appliance. While it was designed to contain a fire and exhaust the by products of combustion to the outside atmosphere this fireplace was not designed to be a home heat source. It should not be altered in any way and manufacturer's instructions should be precisely followed.



2 Water damage is present on the hearth extension in front of the fireplace. The wood is rotten.



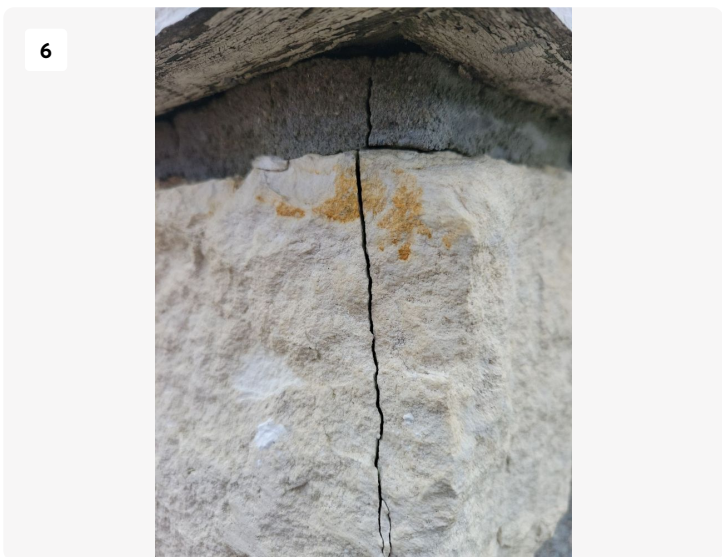
3 Discoloration near the damper is evidence of water intrusion. This will damage the system to some extent.



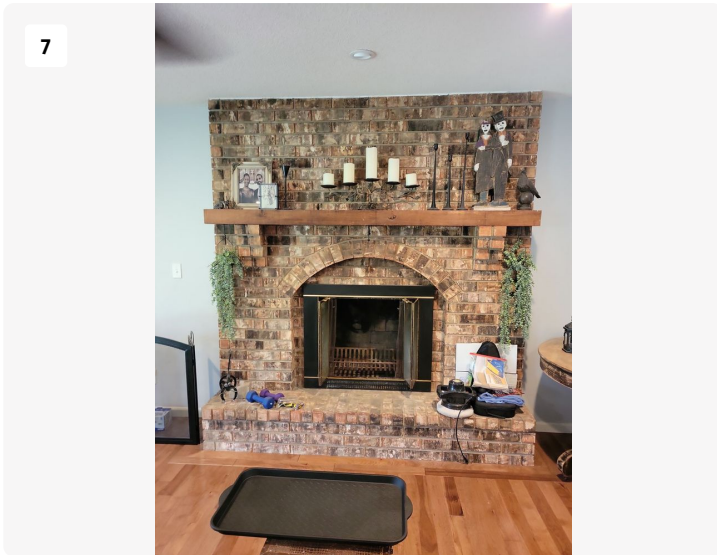
Factory built chimneys come in lengths such as 24 inch or 48 inch. There are joints at each length of pipe.



The air intake for outside combustion air is mostly plugged with dust. This will have a negative impact on performance.



The stone veneer on the chase is stuck to a metal lathe, or screen. The screen is screwed to a substrate of some kind, typically plywood. Once water accesses the plywood it will begin to rot and the stone veneer will fail due to lack of support.



This is a standard masonry fireplace built (mostly) following guidelines from the Brick Institute of America that have not changed much if any in the last century. It is not as efficient as it could be nor as clean burning.



The hearth extension is supported by wood forms. Wood should not be in this area, the hearth extension should be concrete poured as a self supporting slab extending from the chimney.



The smoke chamber is the area directly above the fireplace. It is like an upside down funnel connecting the large fireplace to the relatively small flue. The smoke chamber is not smooth. This creates turbulence in the flue gases which can cause poor performance and increases their residency time causing added creosote buildup. The smoke chamber should be completely smooth and well sealed.

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Through the open cells in these bricks the byproducts of combustion could escape their intended area and deposit flammable creosote in the cavity of the chimney.

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The flue is made up of terra cotta (clay) tiles. They are each 2 feet tall so there is a joint in the flue every two feet. This joint is sealed with mortar. Some of the joints between flue tiles have no mortar. This can allow the byproducts of combustion to escape the flue and deposit flammable creosote in the annular space of the chimney between the flue tiles and the exterior brick. This flue is compromised.

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Flue tiles crack due to thermal shock. During a high heat event the inside of the tile expands faster than the outside resulting in a vertical, or nearly vertical, crack.



Water damage on the ceiling indicates water intrusion from the chimney.



This picture is taken in the attic. The white stain is efflorescence. This is evidence of water intrusion. The stain is the salts and minerals that the water is picked up from the masonry and deposited here as it dried.



The mortar wash on top does not adequately protect the chimney from water intrusion. It should overhang the face of the chimney to provide a drip edge keeping a majority of rain water off the face of the chimney. This is such a bad condition that parts of it can be removed by hand.