# *How to Maintain Consistent Heat with your USSC 6041 Multi-Fuel Stove*

## How to maintain consistent heat with your USSC 6041 Multi-Fuel Stove

*Objective*: During this instruction, you will learn how to maintain consistent heat with a USSC 6041 Multi-Fuel Stove. You will accomplish this by learning how to apply correct adjustments to the pellet feed rate, the agitator speed setting, the draft fan speed, and the damper position.

*Motivation*: During this past winter (2013-2014) record amounts of snow and low temperatures were set throughout the area. Heating costs *soared* across all of America. In some areas, sources of fuel, such as propane, were rationed to ensure shortages will not affect mass populations. Individuals using traditional woodstoves encountered issues if they had not stocked up enough wood. Many are now turning towards pellet stoves as an alternate source of heat to save money.

*Class Set Up:* This is a self-paced class with the benefit of hands-on practical exercise under the supervision of a subject matter expert. The class consists of three lessons, which include (1) cleaning your pellet stove, (2) loading pellets and turning on stove, and (3) maintaining consistent heat. Each lesson is followed by a two-part check on learning. The first part is a written assessment to confirm learning prior to the second, which will be a hands-on practical exercise using a USSC 6041 Multi-Fuel Stove.

### Notes to Student:

Training is in three lessons and should be accomplished within 1 to 2 hours. A subject matter expert will be available throughout the training to provide answers and guidance, as needed or requested. This class is not designed as a pass or fail class. It exists to provide you with all the necessary tools, information, and confidence to use a USSC 6041 Multi-Fuel Stove. If you own a stove, it'll give you skills and knowledge to improve the efficiency of what you already do. If you do not own a stove it will give you the confidence to use a stove if you should choose to buy and put one in your home.

Page 4 provides *safety precautions* you will need to consider as you operate the USSC 6041 Multi-Fuel Stove.

On page 5, you will find a picture of the USSC 6041 Multi-Fuel Stove with annotations you can reference throughout the class.

To begin Lesson One, read pages 6 to 11 to study the proper procedures for cleaning the USSC 6041 Multi-Fuel Stove. You will learn to identify key areas of the stove where airflow can be constricted, effecting efficiency, and to clean all ash and fly ash from the stove. Lesson One will be followed by a two part Check on Learning starting on page 12. The Lesson One Check on Learning answer key can be found on page 26.

To begin Lesson Two, read pages 14 to 17 to study how to identify the properties of wood pellets and to properly load the pellet hopper. Also, you will learn the proper startup procedures for the USSC 6041 Multi-Fuel Stove. Lesson Two will be followed by a two part Check on Learning starting on page 18. The Lesson Two Check on Learning answer key can be found on page 26.

To begin Lesson Three, read pages 20 to 23 to study the procedures for adjusting pellet feed rate, agitator speed, draft fan, and damper to maintain a consistent heat. Lesson Three will be followed by a two part Check on Learning starting on page 24. The Lesson Three Check on Learning answer key can be found on page 26.

At the end of the instructional material, pages 27 to 28, a quick reference guide is provided for your use. This aid can be kept near your stove to assist you during operations, until you feel comfortable with the stove. It will still be helpful after that as a reminder.

# *Safety Precautions*

- Do not operate the heater if you smell smoke coming from the heater. Push the “OFF” Touch pad, monitor your heater, and call your dealer.
- Never use gasoline, gasoline-type lantern fuel, kerosene, charcoal lighter fluid, or similar liquids to start or ’freshen up’ a fire in this heater. Keep all such liquids well away from the heater while it is in use.
- Don’t unplug the heater if you suspect a malfunction. Push the “OFF” Touch pad and inspect the heater.
- Never try to repair or replace any part of the heater unless instructions for consumer are given in this manual.
- All other work should be done by a trained technician.
- The viewing door must be closed and latched during operation.
- Never block free airflow through the open vents of the unit.
- The pellet appliance exhaust system works with negative combustion chamber pressure and a slightly positive chimney pressure, therefore the exhaust system must be completely airtight and properly installed. All pellet vent joints must be sealed with HI-TEMP RTV silicone sealant
- This unit must be properly installed to prevent the possibility of a house fire. The instructions must be strictly adhered to. Do not use makeshift methods, which may compromise the installation.
- Your heater requires periodic maintenance and cleaning. Failure to maintainyour heater may lead to smoke spillage in your home.
- Allow the heater to cool before carrying out any maintenance or cleaning. Ashes must be disposed in a metal container with a tight fitting lid. The closed container of ashes should be placed on a non-combustible surface or on the ground, well away from all combustible materials, pending final disposal.
- The heater will not operate during a power outage. If a power outage does occur, check the heater for smoke spillage and open a window if any smoke spills into the room.
- Keep foreign objects out of the hopper.
- Disconnect the power cord before performing any maintenance. NOTE: Touching the OFF touch pad does not disconnect all power to the heater.
- Do not place clothing or other flammable items on or near the heater. Because this heater can be controlled by a thermostat there is a possibility of the heater turning on and igniting any items placed on or near it.
- Educate all children on the dangers of a high-temperature heater.
- Young children should be supervised when they are in the same room as the heater.
- Caution: NEVER PUT FINGERS NEAR AUGER. Pellet fuel is fed to the burn pot by a screw auger that is driven by a high torque motor.
- Do not burn with insufficient combustion air. A periodic check is recommended to ensure proper combustion air is admitted to the combustion chamber. Setting the proper combustion air is achieved by adjusting the slide damper located on the right hand side of the appliance.
- Soot or creosote may accumulate when the stove is operated under incorrect conditions such as an extremely rich burn (black tipped, lazy orange flames).

# *Stove Schematic*

# *Lesson One: Cleaning Your Stove*

*Objective:* In this lesson you learn how to properly clean the USSC 6041 Multi-Fuel Stove so that it is free of ash, creosote, and fly ash; thus allowing air to freely move though air vents. You will learn to identify key areas of the stove where airflow can be constricted and proper cleaning techniques to complete the task.

*Motivator:* A properly cleaned stove will provide a dependable flame and result in efficiently burning pellets to provide a consistent heat level. The worst-case scenario of an unclean stove is it could cause carbon monoxide poisoning or a house fire.

## Assemble Cleaning Items

Before cleaning your stove the below listed tools will need to be assembled. Each tool is followed by a brief description of its purpose. Since the Ash-Vac and chimney brush are unique items, their pictures are to the right.

| Equipment | Purpose |
|---|---|
| Paint Brush | Use to brush fly ash from the inner walls of the burn chamber. |
| Ash-Vac | Specially designed vacuum cleaner with filter to pick up fine ash. Housing is a metal tank, has an aluminum wand and both filters and hose are fire retardant. |
| 3.5” chimney brush | Hard bristled brush used to clean ash from inside of the exhaust pipe. |
| Bucket with Warm Water | Used for soaking ash pan to loosen up hardened ash. |
| Flathead Screwdriver | Used to scrape hardened ash from ash pan. |

Ash-Vac


Chimney Brush

## Cleaning the Burn Chamber

The USSC 6041 Multi-Fuel Stove operates on a negative pressure venting system. Essentially, this means the stove draws air from the room it is in and pulls it through the stove for oxygen. The air is then pushed out of the exhaust stovepipe. At no time after the air enters the stove is air returned back into the room since the entire stove and stovepipes are sealed. Because of this, it is important to clean the stove weekly in order to maintain proper airflow, thus oxygen, to the flame. When the air is restricted the pellets will not burn efficiently, resulting in poor heat output of the stove.

**Step One:** *Remove Ash Pan and Vermiculite*

*Action One*: Remove the door from stove to provide access to ash pan and vermiculite (Figure 1)
*Action Two*: Remove cotter pin from agitator Annotated by Yellow circle in Figure 2.
*Action three*: Remove burn pan by turning agitator until two prongs are facing down and three up. Lift up on the left side of burn pan and the entire assembly should lift out.
*Action Four*: Remove vermiculite (Figure 3) by carefully pulling bottom out approximately 2 inches and then pull down until vermiculite clears out of catch bar.

Figure 1

Figure 2

Figure 3

**Step Two**: *Clean Ash Pan and Vermiculite*

*Action One*: Use paintbrush to remove fly ash from vermiculite by brushing in the direction of the grooves until all fly ash is removed (Figure 4). Place vermiculite aside in a safe place.

(Caution: Vermiculite is particularly brittle and if handled roughly could break)

*Action Two*: Put ash pan and agitator into bucket of warm water and allow to sit until hardened ash is loosened. Normally, the remainder of the stove can be cleaned while this process occurs. When hardened ash is loose, use Flathead screwdriver to scrape excess ash from ash pan and agitator (Figures 5 & 6). Rinse numerous times and then dry off. Repeat as necessary until all hardened ash has been removed. Figures 7 depicts a clean ash pan.

Figure 4

Figure 5

Figure 6

Figure 7

**Step Three**: *Clean Excess Ash from Walls and Side Air Vents*

*Action*: Use paintbrush to remove fly ash from walls and ceiling of burn chamber (Figure 8). Attention should be placed on sides of burn chamber where the vents are. Figure 9 depicts the right side air vent and a burn chamber wall cleaned of fly ash.

Figure 8

Figure 9

**Step Four**: *Vacuum Burn Chamber and Rear Vent Chamber*

*Action One*: Use Ash-Vac to thoroughly vacuum burn chamber of all ash (Figure 10).
*Action Two*: Locate four entry points to the rear vent chamber, behind the burn chamber, as indicated in Figure 11 where the yellow circles are. For the two lower entry points of the rear vent chamber, lift and remove trapdoors.
*Action Three*: Use Ash-Vac, with small crevice tool, to vacuum rear vent chamber via the four entry points. Figures 12 & 13 depict a clean rear vent.
*Action Four*: Replace the two trapdoors at the bottom of the rear vent chamber.

Figure 10

Figure 11

Figure 12

Figure 13

**Step Five**: *Replace Ash Pan and Vermiculite*

*Action One*: Replace vermiculite by carefully inserting it into catch bar and easing bottom towards the back of burn chamber until it is properly seated.
*Action Two*: Replace burn pan and agitator by ensuring agitator is properly placed with two prongs facing down and three up. Place right side of burn pan and agitator into slot and then slide left side down until firmly seated.
*Action three*: Replace cotter pin to agitator
*Action Four*: Replace stove door if removed earlier.

## Clean Exhaust Pipe

As stated above, the USSC 6041 Multi-Fuel Stove operates on a negative pressure venting system. The exhaust pipe is the final portion of this system and if restricted will hamper operation of the stove and will decrease the ability to properly burnt pellets and maintain a consistent heat. Normally, the exhaust pipe does not require as much cleaning as the burn chamber and will only need attention every second or third cleaning of the burn chamber. As you operate your stove you will be able to determine how often it needs to be cleaned.

**Step One**: *Remove terminator cap and cleanout cover*

*Action One*: Gently turn base of terminator cap (Figure 14) counter clockwise, ensuring that the exhaust pipe does not turn as well, until the terminator cap stops and then pull off exhaust pipe.
*Action Two*: Gently turn cleanout cover (Figure 15) counter clockwise, ensuring that the exhaust pipe does not turn as well, until the cleanout cover stops and then pull off exhaust pipe.

Figure 14

Figure 15

**Step Two**: *Brush out Exhaust Pipe*

*Action*: Figure 16 shows the exhaust pipe with fly ash and creosote in it and in need of cleaning. Insert a 3.5” chimney brush into stovepipe as far as it will go and pull out in a swift manner. Repeat this process until stovepipe is clear of all fly ash and creosote. Start with the outside pipe until it is clean and then move inside and work the pipe from that side until clean. Figure 17 shows a stovepipe clear of all fly ash and creosote.

Figure 16

Figure 17

**Step Three**: *Replace Terminator Cap and Cleanout Cover*

*Action One*: Properly line up terminator cap slot with exhaust pipe grove; gently slide terminator cap onto exhaust pipe; and the turn clockwise until snug.
*Action Two*: Properly line up cleanout cover slot with exhaust pipe grove; gently slide cleanout cover onto exhaust pipe; and the turn clockwise until snug.

# Lesson One – Clean Stove: Check on Learning

**Instructions:** This end of lesson check on learning will consist of two parts. Part one is a written exam to check your understanding of cleaning the stove prior to the hands-on practice. Part two will be hands-on practice with a subject matter expert providing over the shoulder assistance to ensure proper cleaning of the stove.

## Lesson One ─ Self-check

1. List all required cleaning gear:

2. On average, how often should you clean your burn chamber?

3. List the major areas which need to be cleaned of ash, fly ash and hardened ash:

4. Which picture best depicts a clean burn chamber with all fly ash brushed away?

a. 

b. 

c. 

5. Which picture best depicts a clean burn chamber with all ash vacuumed out?

a. 

b. 

c. 

6. Which picture best depicts an ash pan with all hardened ash removed?

a. 

b. 

c. 

7. How often do you need to clean the exhaust pipe?

8. What should be fully cleaned out of exhaust pipe?

9. Which picture best depicts a clean burn chamber with all fly ash brushed away?

a. 

b. 

c. 

# Lesson One – Hands-On Practical Exercise

You will now have an opportunity to work on an actual USSC 6041 Multi-Fuel Stove and clean it under the guidance of the instructor. The instructor will use the following checklist to ensure you are able to perform each step while cleaning the USSC 6041 Multi-Fuel Stove.

| Skills | Performance Objectives | Standard Met? |
|---|---|---|
| Clean stove | Given USSC 6041 Multi-Fuel Stove, clean stove leaving it free of fly ash and all air vents permit air to move through freely. | Y / N |
| Assemble all cleaning gear | Given a USSC 6041 Multi-Fuel Stove, in need of cleaning, and a job aid, assemble all cleaning gear. Assemble all cleaning items listed in the job aid. | Y / N |
| Clean burn chamber | Given USSC 6041 Multi-Fuel Stove and proper cleaning gear, clean the burn chamber by removing all fly ash, ash, and hardened ash until it is all removed and the air vents are clean. | Y / N |
| Remove ash pan and vermiculite | When preparing to clean a USSC 6041 Multi-Fuel Stove burn chamber, remove ash pan and vermiculite. Remove items per instruction manual in proper order so vermiculite does not break. | Y / N |
| Clean excess ash off walls and out the side air vents | Given a paintbrush, brush access fly ash off burn chamber walls and out of side air vents, until all fly ash is removed. | Y / N |
| Vacuum burn chamber and rear vent chamber | Given an Ash-Vac, vacuum all ash out of burn chamber and vent chamber, until all ash is removed. | Y / N |
| Clean ash pan and vermiculite | Given a paintbrush, brush all fly ash off of vermiculite until all loose ash is removed.<br>Given a bucket containing warm water, soak and then clean hardened ash off ash pan, until hardened ash is all removed. | Y / N |
| Replace ash pan and vermiculite | Upon completion of cleaning burn chamber, vents, ash pan, and vermiculite, replace ash pan and vermiculite in proper order so vermiculite does not break. | Y / N |
| Clean exhaust pipe | Given USSC 6041 Multi-Fuel Stove and proper cleaning gear, clean the exhaust pipe by removing all fly ash and creosote. | Y / N |
| Remove terminator cap and cleanout cover | When preparing to clean a USSC 6041 Multi-Fuel Stove exhaust pipe, remove terminator cap and cleanout cover without damaging exhaust pipe. | Y / N |
| Brush out exhaust pipe | Given a 3.5” chimney brush, brush out exhaust pipe until no further fly ash and creosote is present. | Y / N |
| Replace terminator cap and cleanout cover | Upon completion of cleaning out exhaust pipe, replace remove terminator cap and cleanout cover without damaging exhaust pipe. | Y / N |

# *Lesson Two:*

# *Load Pellets & Turn Stove On*

*Objective:* In this lesson you learn how to identify types of pellets, whether they have too much moisture, and how to properly load them into the stove. Also learned in this lesson are the proper steps to turn on the USSC 6041 Multi-Fuel Stove.

*Motivator:* A pellet with too much moisture will not burn effectively and will decrease the efficiency of the USSC 6041 Multi-Fuel Stove's heat output. Also, a pellet with too much moisture in it will produce thicker ash which will block vents and require more frequent cleanings.

# Load Pellets

Each time you load pellets into the pellet hopper, many considerations need to be made prior to just loading your pellets into the stove. The following steps will cover types of pellets, where and when to by, how to store them and last if the pellets you have on hand are even good to use.

**Step One**: *Classify Types of Pellets*

It is important to understand the difference between soft wood hard wood pellets. The properties of each will affect what settings on the stove to be made. Hard wood pellets generally burn cleaner and produce a more consistent heat, but softwood will burn hotter while creating more ash. The qualities of both hardwood and soft wood pellets are listed below.

| Hardwood | Softwood |
|---|---|
| Lower moisture content<br>Denser fuel<br>Burns longer<br>Hotter coals<br>Less creosote buildup | Burns hotter initially<br>Easy to light<br>Produces more ash<br>Burns up more quickly |

**Step Two**: *Purchase Pellets*

An important consideration prior to starting your USSC 6041 Multi-Fuel Stove is having an appropriate amount of pellets on hand. On an average winter, you may burn through a 3 tons of pellets. Pellets normally come in 40 pounds bags. The higher the feed rate you set your stove to, the more pellets you will go through in a week. Table 3 shows an average rate of consumption per day, and then depicts how my bags to buy based off of various feed rates.

> Each stove burns at a different rate based off of a variety of factors, such as house type or pellet type. You'll have to closely monitor your stove for the first season in order to validate your particular feed rate versus consumption per day.

| Feed rate 1 to 3 = 1 bag/day | Feed rate 4 to 7 = 1.3 bag/day | | Feed rate 8 to 10 = 1.7 bag/day |
|---|---|---|---|
| | Feed Rate = 1 to 3 | Feed Rate = 4 to 7 | Feed Rate = 8 to 10 |
| 1 Week's Supply | 7 | 10 | 12 |

**Step Three**: *Store Pellets*

Since it is a normal practice to buy pellets in bulk, to save money, we will now discuss proper storage of your pellets. You will want to store your pellets in a dry area free from flooding, mold, and excessive humidity. Pellets can be stored outside, but they need to be in a shed or if a structure such as a carport, it is recommended to keep them up off the ground via a pallet. If stored in this manner, a good practice to follow is to place some type of barrier between the

pellets in the ground, even if on a pallet. This will prevent mice and other animals trying to dig into the pellets from the underside. Also, placing a waterproof tarp over the pellets helps cut down on moisture.

**Step Four**: *Check Pellets For Moisture*

As stated before, it is important not to use pellets with too much moisture in them. Figure 18 shows acceptable pellets. A normal pellet will have a smooth cylindrical body, with its only jagged edges being on the ends as a result of manufacturing. When a pellet gets wet it will expand and the bonding agent used to keep it at a consistent size will break down. Figure 19 depicts a good pellet (shown on the left) beside a pellet has gotten wet. 20 shows a group of pellets from the side that have been wet. Once a pellet gains any moisture beyond manufacturing, it should no longer be used in your pellet stove.

Figure 18

Figure 19

Figure 20

**Step Five**: *Load Pellets*

When it comes time to load ensure that pellets are not in the auger safety switch. (Figure 21) The auger safety switch is located near the back left hinge. Also, when loading pellets, ensure that the pellet hopper is not overfilled to point that the lid will not close. Check hopper twice a day to ensure there are enough pellets in this hopper to last until next check.

Figure 21

## Turn Stove On

*Action One*: Prior to operating your USSC 6041 Multi-Fuel Stove Ensure all doors, lids, and cleanouts are properly closed, and then turn on.

*Action Two*: Refer to table below for various command inputs for the stove. Press the on button and set initial pellet rate, for startup you will select 2.

| | |
|---|---|
|  | A: Pellet Feed Rate<br>B: Room Fan<br>C: Draft Fan<br>D: Agitator Control<br>E: On<br>F: Off<br>G: Auger Delay<br>H: Set Mode |

*Action Three*: Monitor the burn chamber until pellets ignite. Figure 22 shows a good start up flame. Scenarios to watch for include; too many pellets in burn pot, which constricts airflow; pellet feed rate too fast, which will knock out the flame; or draft fan set too high, which will blow flame out. A best practice for starting up the stove is to set pellet feed rate at 2, and setting draft fan at seven, while using damper to fine-tune the amount of air. Occasionally, press the auger delay the stop feed of pellets for one minute. This keeps the burn pan from filling too quick and will help prevent pellets from knocking the flame out.

Figure 22

# Lesson Two – Load Pellets and Turn on Stove: Check on Learning

**Instructions:** This end of lesson check on learning will consist of two parts. Part one is a written exam to check your understanding regarding proper pellet selection, loading the stove and turning the stove on. Part two will be hands-on practice with a subject matter expert providing over the shoulder assistance to ensure proper loading and startup of the stove.

**Lesson Two – Self-check**

1. Where is the stove auger safety switch located in the pellet hopper?

2. Draw line from the pellet types to the properties which best describe either hardwood or softwood pellets.

| | |
|---|---|
| | Lower Moisture Content |
| | Burns Hotter Initially |
| Hardwood | Denser Fuel |
| | Burns Longer |
| | Easy To Light |
| | Produces More Ash |
| Softwood | Hotter Coals |
| | Less Creosote Buildup |
| | Burns Up More Quickly |

3. Give the following pellet stove consumption rates; calculate how many 40lbs bags of pellets to buy for one week or one month.

Feed rate 1 to 3 = 1 bag/day  Feed rate 4 to 7 = 1.3 bag/day  Feed rate 8 to 10 = 1.7 bag/day

| | Feed Rate = 1 to 3 | Feed Rate = 4 to 7 | Feed Rate = 8 to 10 |
|---|---|---|---|
| 1 Week's Supply | | | |
| 1 Month's Supply | | | |

4. State the proper procedures for storing wood pellets.

5. Which picture best depicts unacceptable pellets due to high moisture?

a. 

b. 

c. 

6. List proper steps to start the USSC 6041 Multi-Fuel Stove.

# Lesson Two – Hands-On Practical Exercise

You will now have an opportunity to work on an actual USSC 6041 Multi-Fuel Stove; selecting proper pellets and starting the stove under the guidance of the instructor. The instructor will use the following checklist to ensure you are able to perform each step while loading pellets into and turning on the USSC 6041 Multi-Fuel Stove.

| **Skills** | **Performance Objectives** | **Standard Met?** |
|---|---|---|
| Load pellets | Given a USSC 6041 Multi-Fuel Stove and pellets load the pellet hopper to a level which will allow the lid to close in the stove auger safety switch to not engage. | Y / N |
| Classify types of pellets | Prior to purchasing wood pellets for a USSC 6041 Multi-Fuel Stove, classify types of pellets. Be capable of discriminating the difference in properties between hardwood and softwood. | Y / N |
| Purchase pellets | Given a USSC 6041 Multi-Fuel Stove and a desired pellet feed rate, purchase enough pellets to last for a predetermined amount of time. | Y / N |
| Store pellets | Given soft or hard wood pellets, store pellets in an area will maintain minimal moisture levels in the pellets. | Y / N |
| Check pellets, is there any moisture | Given soft or hard wood pellets that have been stored properly, ensure there is no moisture within the pellets before use. | Y / N |
| Turn stove on | Given a USSC 6041 Multi-Fuel Stove turn stove on. Follow all startup steps. | Y / N |

# *Lesson Three: Maintain Consistent Heat*

## Lesson Three – Maintain Consistent Heat

*Objective:* In this lesson you learn how to adjust the pellet feed rate, agitator speed, draft fan, and damper on your USSC 6041 Multi-Fuel Stove to maintain a consistent heat.

*Motivator:* A properly adjusted USSC 6041 Multi-Fuel Stove will evenly burn pellets, with minimal ash produced, and produce a predictable level of heat. If the stove is adjusted improperly, pellets will burn poorly, producing high ash, and decreasing bestows efficiency, thus raising the cost of operation.

## List the Properties of a Good and Poor Flame

Before we start adjusting the stove, it is important to know what a good flame is and what a poor flame is. In this portion of the lesson a picture followed by a description of each flame is given. (Figures 23 through 28). The three settings we can change that effect the flame are; pellet feed rate, agitator speed, draft fan, and damper. Each adjustment will be discussed separately.

Good Flame
Figure 23

Start Up Flame
Figure 24

Lazy Flame
Figure 25

Too Much Air
Figure 26

Flame With Lack Of Air
Figure 27

Flame Smother From
Too Much Smoke
Figure 28

## Set Pellet Feed Rate

Refer to table 4 for the proper button to select the desired feed rate. You have a choice of feed rates between 1 through 10. The higher the feed rate the more pellets will be fed into the ash pan, this will in turn provide more pellets to burn creating a higher heat output.

To make fine adjustments on pellet feed rate, observe the rate of burn in the ash pan. If the pellets are building up faster than they burn, and assuming you're not adjusting your draft fan, you would need to decrease the pellet feed rate. Conversely, if the pellets are burning out quicker and you choose not to alter the draft fan, a higher pellet feed rate needs to be selected.

## Adjust Agitator Speed

Refer to table 4 for the proper button to select the desired agitator speed, the default setting is one higher than the pellet feed rate and you have a choice of speed between 1 through 10. The agitator turns and mixes order burning pellets with new pellets recently added to the ash pan. This mix of old and new pellets facilitates even burning of pellets. It also has the added bonus of sifting ash through the bottom of the ash pan. This facilitates draft fan airflow assisting overall burn quality the pellets.

## Adjust Draft Fan and Damper

*Action One*: The true science in operating the USSC 6041 Multi-Fuel Stove is in the adjustments made to the draft fan and the damper. By increasing the draft fan you supply additional oxygen to the burn chamber permitting a higher flame and the ability to burn more pellets.

Through the use of the damper, you can fine tune levels of oxygen in the burn chamber. For example, refer to figures 29 and 30. In figure 29, the damper is pulled out to its full open position, this provides maximum oxygen at the current stove settings. Conversely in figure 30, the damper is pushed forward in the full closed position. At this point, no other settings of the stove have been changed and you can see the effects the damper has on the flame, is much lower.

Figure 29

Figure 30

*Action Two*: Refer to table 4 for the proper button to select the desired draft fan speed, the default setting is one higher than the pellet feed rate and you have a choice of speed between 1 through 10. As seen in Figure 29 and 30 the damper is located under the burn chamber. When making fine adjustments to the draft fan or the damper wait 3 to 5 minutes after each adjustment to permit time for the flame to fully adjust.

| FLAME TYPE | CORRECTIVE ACTION TO TAKE |
|---|---|
| Lazy Flame (Figure 23) | First adjust damper out to provide more air. If that does not work increase draft fan up one level |
| Flame With Too Much Air (Figure 24) | First, adjust damper in to provide less air. If that does not work decrease draft fan down one level. |
| Smothered Flame (Figure 25) | Move damper in and out to vary air speed to “stoke” the fire until flame starts back up. Then check for constricted air flow in ash pan. |
| Flame With Lack Of Air (Figure 26) | First adjust damper out to provide more air. If that does not work increase draft fan up one level. Then check for constricted air flow in ash pan or side air vents |

## Is Airflow Constricted

After approximately a week of constantly running your USSC 6041 Multi-Fuel Stove, ash buildup will start to constrict the vents and cause poor airflow. This may occur earlier if the burn quality of pellets is not monitored, and pellets are permitted to burn poorly.

If the stove flame remains low, regardless of the amount of air you provide, airflow may be constricted at the side of burn chamber air vents.

Another indicator of poor airflow is if the ash pan is so full of ash that it fully covers the agitator. This is an indicator that there is hardened ash buildup in the ash pan preventing ash from falling through the vents and constricting air into the ash pan.

## Turn off Stove and Clean

*Action One*: Refer to table 4 for the proper button to turn off the stove. When you determined that the stove needs to be turned off or it is time for weekly maintenance press the off button. At this point, the stove will enter its shutdown mode.

Regardless of the stove’s current settings, the pellet feed rate will slow down to 1, and all other settings will go on high, 10. The stove will maintain these settings until the burn chamber temperature decreases below approximately 90°F, at which time the stove will shut off.

> *Caution*: During this time, it is important to monitor the shutdown process. There is a hazard of pellets remaining in the ash pan and still smoldering after the temperature decreased to point that the stove turns off. If this happens there is a risk of *carbon monoxide poisoning* in the home.

*Action Two*: After the stove shuts down allow approximately an hour for it to be completely cool and metal pieces able to be handled. At this point in time, you may start cleaning your stove.

# Lesson Three – Maintain Consistent Heat: Check on Learning

**Instructions:** This end of lesson check on learning will consist of two parts. Part one is a written exam to check your understanding of how to maintain a consistent heat level by adjusting the various stove settings. Part two will be hands-on practice with a subject matter expert providing over the shoulder assistance to ensure proper loading and startup of the stove.

## Lesson Three – Self-check

1. Where is the stove auger safety switch located in the pellet hopper?

2. Which picture shows the operator adjusting the pellet feed rate?

a. 

b. 

c. 

3. Which picture shows the operator adjusting the agitator speed?

a. 

b. 

c. 

4. When would you adjust the agitator to a level higher than the typical setting?

5. What adjustments would you make with the following situations?
   a. Lazy Flame:
   b. Flame With Too Much Air:
   c. Smothered Flame:
   d. Flame with Lack of Air:

6. State what type of flame the picture best depicts.

a. _____

b. _____

c. _____

d. _____

e. _____

f. _____

7. What two areas of the 6041 Multi-Fuel Stove will most likely cause poor airflow if filled with excess ash?

# Lesson Three – Hands-On Practical Exercise

You will now have an opportunity to make adjustments on an actual USSC 6041 Multi-Fuel Stove in order to maintain a consistent heat. The instructor will use the following checklist to ensure you are able to perform each step while maintaining consistent heat with the USSC 6041 Multi-Fuel Stove.

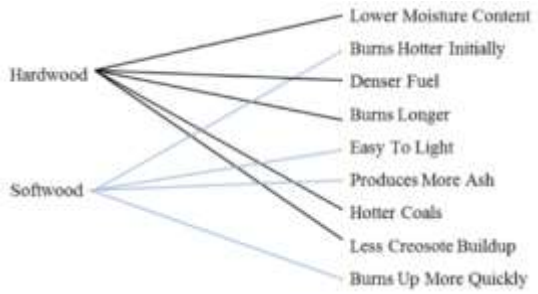
| Skills | Performance Objectives | Standard Met? |
|---|---|---|
| Maintain consistent heat | Given a lit USSC 6041 Multi-Fuel Stove adjust pellet feed rate, agitator speed, draft fan, and damper to maintain a consistent heat within a 3 degree Fahrenheit tolerance. | Y / N |
| Reload pellet hopper | Given a USSC 6041 Multi-Fuel Stove and pellets load the pellet hopper to a level which will allow the lid to close in the stove auger safety switch to not engage. | Y / N |
| Is pellet hopper full | Given a USSC 6041 Multi-Fuel Stove, validate that the pellet hopper is full. Check hopper twice a day to ensure their enough pellets in the last until next check. | Y / N |
| Set pellet feed rate | Given a lit USSC 6041 Multi-Fuel Stove and a desired consistent heat range adjust pellet feed rate to maintain burn of pellets to produce a good flame with less than 5% unburned pellets. | Y / N |
| Adjust agitator speed | Given a lit USSC 6041 Multi-Fuel Stove and a desired consistent heat range adjust agitator speed in conjunction with pellet feed rate to maintain less than 5% unburned pellets. | Y / N |
| Adjust draft fan and damper | Given a lit USSC 6041 Multi-Fuel Stove and desired consistent heat range, adjust draft fan and damper to maintain a good flame that is shallow steady and solid without flickering. | Y / N |
| Flame good and pellets burning consistently | Given a lit USSC 6041 Multi-Fuel Stove after pellet feed rate, agitator speed, draft fan, and damper have been adjusted determine if flame is burning good or poorly 90% of the time. | Y / N |
| Is airflow constricted | Given a lit USSC 6041 Multi-Fuel Stove with a poorly burning flame, determine if the airflow is constricted 90% time. | Y / N |
| Turn off stove and clean | Given a lit USSC 6041 Multi-Fuel Stove with a poorly burning flame and a constricted airflow properly turn off the stove *safely* 100% time. | Y / N |

## Lesson One – Self-check Answer Key

1. Ash-Vac, Paint Brush, 3.5” Chimney Brush, Bucket with Warm Water, Flathead Screwdriver
2. Once a week.
3. b
4. c
5. c
6. At least every two to three times you clean the burn chamber, unless needed sooner.
7. All fly ash and creosote.
8. a

## Lesson Two – Self-check Answer Key

1. It is located near the back left hinge.
2.




4. 1 Week’s Supply 7 10 12 1 Month’s Supply 30 39 51
5. Store pellets in a dry area free from flooding, mold, and excessive humidity.
6. c
8. Ensure all doors, lids, and cleanouts are properly closed and then set Pellet feed rate. Watch burn chamber to ensure pellets ignite and do not smother out

## Lesson Two – Self-check Answer Key

1. It is located near the back left hinge.
2. b
3. c
4. When burnt pellets result in thicker ash which does not easily fall through the ash pan.

5.
a. First adjust damper out to provide more air. If that does not work increase draft fan up one level.
b. First, adjust damper in to provide less air. If that does not work decrease draft fan down one level.
c. Move damper in and out to vary air speed to “stoke” the fire until flame starts back up. Then check for constricted air flow in ash pan.
d. First adjust damper out to provide more air. If that does not work increase draft fan up one level. Then check for constricted air flow in ash pan or side air vents.

6.
a. Lazy Flame
b. Flame With Lack Of Air
c. Start Up Flame
d. Flame Smother From Too Much Smoke
e. Too Much Air
f. Good Flame

7. Ash Pan and Side Air Vents

# Quick Reference Guide: USSC 6041 Multi-Fuel Stove

| Cleaning Equipment | |
|---|---|
| **Equipment** | **Purpose** |
| Paint Brush | To brush fly ash from the inner walls of the burn chamber. |
| Ash-Vac | Specially designed vacuum cleaner to pick up fine ash from various areas of the stove. |
| 3.5” chimney brush | Hard bristled brush used to clean ash from inside of the exhaust pipe. |
| Bucket with Warm Water | Used for soaking ash pan to loosen up hardened ash. |
| Flathead screwdriver | Used to scrape hardened ash from ash pan. |

## Control Panel


A: Pellet Feed Rate

B: Room Fan

C: Draft Fan

D: Agitator Control

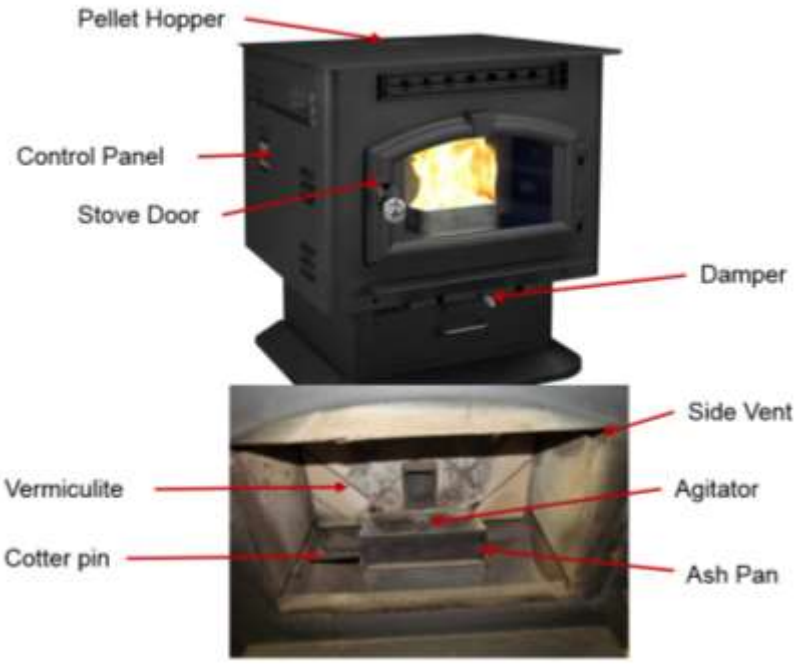
E: On

F: Off

G: Auger Delay

H: Set Mode

| Pellet Types And Properties | | | |
|---|---|---|---|
| **Hardwood** | **Softwood** | **Good Pellets** | **Too Moist Pellets** |
| Lower moisture content<br>Denser fuel<br>Burns longer<br>Hotter coals<br>Less creosote buildup | Burns hotter initially<br>Easy to light<br>Produces more ash<br>Burns up more quickly |  |  |



# Different Types Of Flames

Good Flame

Start Up Flame

Lazy Flame

Too Much Air

Flame With Lack Of Air

Flame Smother From Too Much Smoke

| FLAME TYPE | CORRECTIVE ACTION TO TAKE |
|---|---|
| Lazy Flame | First adjust damper out to provide more air. If that does not work increase draft fan up one level |
| Flame With Too Much Air | First, adjust damper in to provide less air. If that does not work decrease draft fan down one level |
| Smothered Flame | Move damper in and out to vary air speed to “stoke” the fire until flame starts back up. Then check for constricted air flow in ash pan |
| Flame With Lack Of Air | First adjust damper out to provide more air. If that does not work increase draft fan up one level. Then check for constricted air flow in ash pan or side air vents |

# Appendix A

## Materials Revision Matrix Analysis

| Instructional Strategy | Problem Identified | Proposed Changes | Evidence and Source |
|---|---|---|---|
| Pre-Instruction and Motivation | None | None | Questionnaire and Interview during analyze learners stage |
| Entry Skills | Everyone was ok with the concept of collecting the tools, but felt more information was need on the application of tools | Add pictures of the tools, especially chimney brush and Ash-VAC | Small-group evaluation |
| Presentation | More pictures of stove for better understanding<br><br>Additional comments on Ash vac vs. normal vacuum | Add pictures of auger and ash pan with cotter pin clearly annotated<br><br>Ash vac information added. | One-to-one with SME<br>Small-group evaluation |
| Learner Participation (Practice with Feedback) | Job Aid needed more information, such as instruction on use and additional notes | For job aid: add job aid instructions and stove schematic. Also, add corrective actions to take with flames. | One-to-one with SME<br>Small-group evaluation |
| Assessment | Written test too long and required much memorization, learners preferred more time for hands on | Written test items reduced to just the most important items | Small-group evaluation |
| Transfer | None | None | One-to-one with SME<br>Small-group evaluation |
| General: Added safety-of-use warning at the beginning of the training<br><br>Adjusted some formatting and the context of some statements based on Dr. Wanstreet's recommendations. | | | |