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TESTING OF *STOVETOP FIRESTOP®* RANGEHOOD, IN GENERAL ACCORDANCE WITH UL SUBJECT 300A, *OUTLINE OF INVESTIGATION FOR EXTINGUISHING SYSTEM UNITS FOR RESIDENTIAL RANGE TOP COOKING SURFACES (ISSUE NO. 3, NOVEMBER 21, 2006)*

FINAL REPORT
Consisting of 18 Pages

SwRI® Project No.: 01.21602.16.104b
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Report Date: December 7, 2016

Prepared for:

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Prepared by:

A handwritten signature in black ink, appearing to read "J. Huczek".

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A handwritten signature in black ink, appearing to read "Matthew S. Blais".

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1.0 INTRODUCTION

The objective of the test program was to evaluate the functionality of the StoveTop FireStop® Rangehood automatic fire suppression units in typical residential indoor cooktop fire situations. Testing was conducted in general accordance with UL Subject 300A, *Outline of Investigation for Extinguishing System Units for Residential Range Top Cooking Surfaces (Issue No. 3, November 21, 2006)*, at the Client's test facility, located in Fort Worth, Texas. The testing was conducted in general accordance, since not all the tests described in UL 300A were performed. However, the test setup and extinguishment tests were very similar to Test No. 8, described in Table 4.1 of UL 300A.

Mr. Jason Huczek, representing Southwest Research Institute, was present to witness testing. This report documents the testing performed and the results obtained.

The test methods described in this report are intended to measure and describe the properties of materials or products in response to heat and flame under controlled laboratory conditions. The results should not be used alone to describe or appraise the fire hazard or the fire risk of materials, products, or assemblies under actual fire conditions. However, results of this test may be used as elements of a complete fire hazard for fire risk assessment, which takes into account all the factors that are pertinent to an assessment of the fire hazard or risk of a particular end-use.

The results presented in this report apply specifically to the specimens tested, in the manner tested, and not to the entire production of these or similar materials, nor to the performance when used in combination with other materials.

2.0 FIRE SUPPRESSION SYSTEM DESCRIPTION

The Client identified the system under test as, *Automatic Fire Suppression System for Grease Fires on Indoor Residential Cooktops (Class K)*. The specific product tested was the Stovetop Firestop® Rangehood device. A product data sheet for this device can be referenced in Appendix A.

Figure 1 shows a photograph of the devices in their bulk and individual packaging. Figure 2 provides a close-up photograph of two angles of the device out of the packaging. Figure 3 shows two angles of the devices installed prior to a fire test.



Figure 1. Stovetop Firestop® Bulk and Individual Packaging.



Figure 2. Stovetop Firestop® Close-Up View.

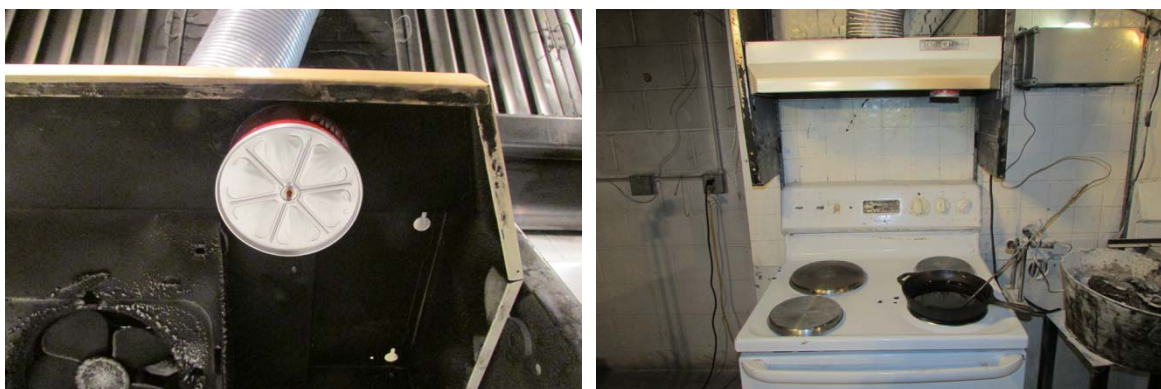


Figure 3. Stovetop Firestop® Installed Prior to a Fire Test.

3.0 TEST CONFIGURATION AND PROCEDURE

The testing was conducted in the WilliamsRDM, Inc. fire test facility which was constructed to replicate a typical kitchen environment. The facility is climate controlled and contains a residential electric stove manufactured by Hotpoint (model number RB526D H1WW). A residential range hood manufactured by Broan, model number 42000, is positioned above the stove and the mounting height is adjustable to allow the distance from the stove to the hood to be varied as desired. Metal partitions are mounted to both sides of the range hood to simulate upper cabinets which are present in typical kitchen arrangements.

Two Microhood mounting heights were tested, 27 in. and 35 in., as measured from the burner surface to the bottom of the device surface. These mounting heights represent the lower and upper range of typical kitchen arrangements, based on a survey conducted by WilliamsRDM, Inc.

Two skillet sizes were tested, 10-in and 13-in diameter. These diameters are at the upper and lower ranges of the majority of skillets used for residential cooking, based on a survey conducted by WilliamsRDM, Inc. Cast iron construction was selected for both skillets. This represents a worst case due to its composition and thicker construction and likely makes the re-ignition potential greater because it retains heat longer. Two oil depths were used for testing: 1/4-in and 3/8-in.

Vegetable oil was selected for use during all testing because it is the most common oil used for residential shallow pan cooking, based on a survey conducted by WilliamsRDM, Inc. Figure 4 shows a photograph of the oil used during testing.



Figure 4. Vegetable Oil Used for Fire Tests.

Instrumentation for the testing included a thermocouple (Omega Engineering, Type K, part number – TJ36-CAXL-14G-18) to measure the oil temperature, a data logger (Extech Instruments, 3 Channel Data logging Thermometer – Model SD200) to record the oil temperature and a video system to document each test and record observations.



Figure 5. Oil Temperature Measurement (Left: Thermocouple Probe, Right: Data Logger).



Figure 6. Photograph of Video Test Screen.

4.0 TEST PROCEDURE

For each test, the skillet is to be placed on the largest burner at the front of the stove. The largest burner produces the most heat input to the skillet and the front position is the location most used in residential cooking applications, based on a survey conducted by WilliamsRDM, Inc. The burner was set at the highest setting for all tests. The general test procedure used for all testing was as follows:

1. Place fire suppression units in range hood per published mounting instructions
2. Place skillet on largest front burner (cast iron 10/13-in. diameter)
3. Pour oil into skillet (vegetable oil to specified depth)
4. Position thermocouple in oil (tip to be approx. 1/8-in. below the surface)
5. Record unit mounting height
6. Record skillet size and material
7. Record oil type (vegetable)
8. Record oil depth and volume
9. Start video recording
10. Turn on range hood fan
11. Turn on burner to the highest setting
12. Heat oil to auto-ignition point
13. Allow fire to grow
14. Observe actuation of unit and suppression of the fire
15. Turn burner off after unit actuation
16. Observe skillet oil temp until it falls below 650°F (below auto-ignition temp)
17. Playback video and record data
 - a. Time to oil auto-ignition
 - b. Oil temperature at auto-ignition time

- c. Time to unit actuation from auto-ignition time
 - d. Oil temperature at unit actuation
 - e. Time to fire extinguishment from unit actuation
 - f. Time from unit actuation to oil temperature decrease to 650°F, or to re-ignition
18. Clean all surfaces and cool the test pan to ambient temperature before next test.

5.0 RESULTS

Testing was conducted in general accordance with UL 300A, and per the procedure outlined above, at the Client's test facility, located in Fort Worth, Texas. Mr. Jason Huczek, representing Southwest Research Institute, was present to witness testing. Table 1 provides a summary of the observations and results for each test. The *Stovetop Firestop® Rangehood Device* successfully extinguished all the test fires without re-ignition. Figures 7-14 provide selected photographs from each test.

Table 1. Summary of Test Results for Stovetop Firestop® Rangehood Device.

Test Date	Test No.	Skillet Diameter (inches)	Oil Depth (inches)	Amount of Oil (cups)	Oil Type	Mounting Height (inches)	Time to Oil Auto-Ignition (min:s)	Oil Temp at Ignition (°F)	Time to Actuation from Ignition (s)	Oil Temp at Actuation (°F)	Time to Ext. from Actuation (s)	Time from Actuation to 650°F Oil Temp (min:s)
9/27/16	1	10	¼	1.0	Vegetable	27	8:39	676	38	820	3	5:20
9/27/16	2	10	3/8	1.5	Vegetable	27	10:10	702	26	771	3	3:32
9/27/16	3	13	¼	2.0	Vegetable	27	16:41	727	22	773	3	3:03
9/27/16	4	13	3/8	2.5	Vegetable	27	17:14	680	38	791	3	3:17
9/27/16	5	10	¼	1.0	Vegetable	35	9:00	719	30	798	3	3:21
9/28/16	6	10	3/8	1.5	Vegetable	35	9:43	688	33	792	2	ND
9/28/16	7	13	¼	2.0	Vegetable	35	15:45	716	38	805	6*	3:43
9/28/16	8	13	3/8	2.5	Vegetable	35	17:00	707	28	780	2	3:36

ND: not determined – power was temporarily lost at the test site

* Note: 2 out of 6 petals opened on the device, which led to a longer extinguishment time compared to the other tests



Figure 7. Selected Photographs from Test 1.



Figure 8. Selected Photographs from Test 2.



Figure 9. Selected Photographs from Test 3.



Figure 10. Selected Photographs from Test 4.



Figure 11. Selected Photographs from Test 5.

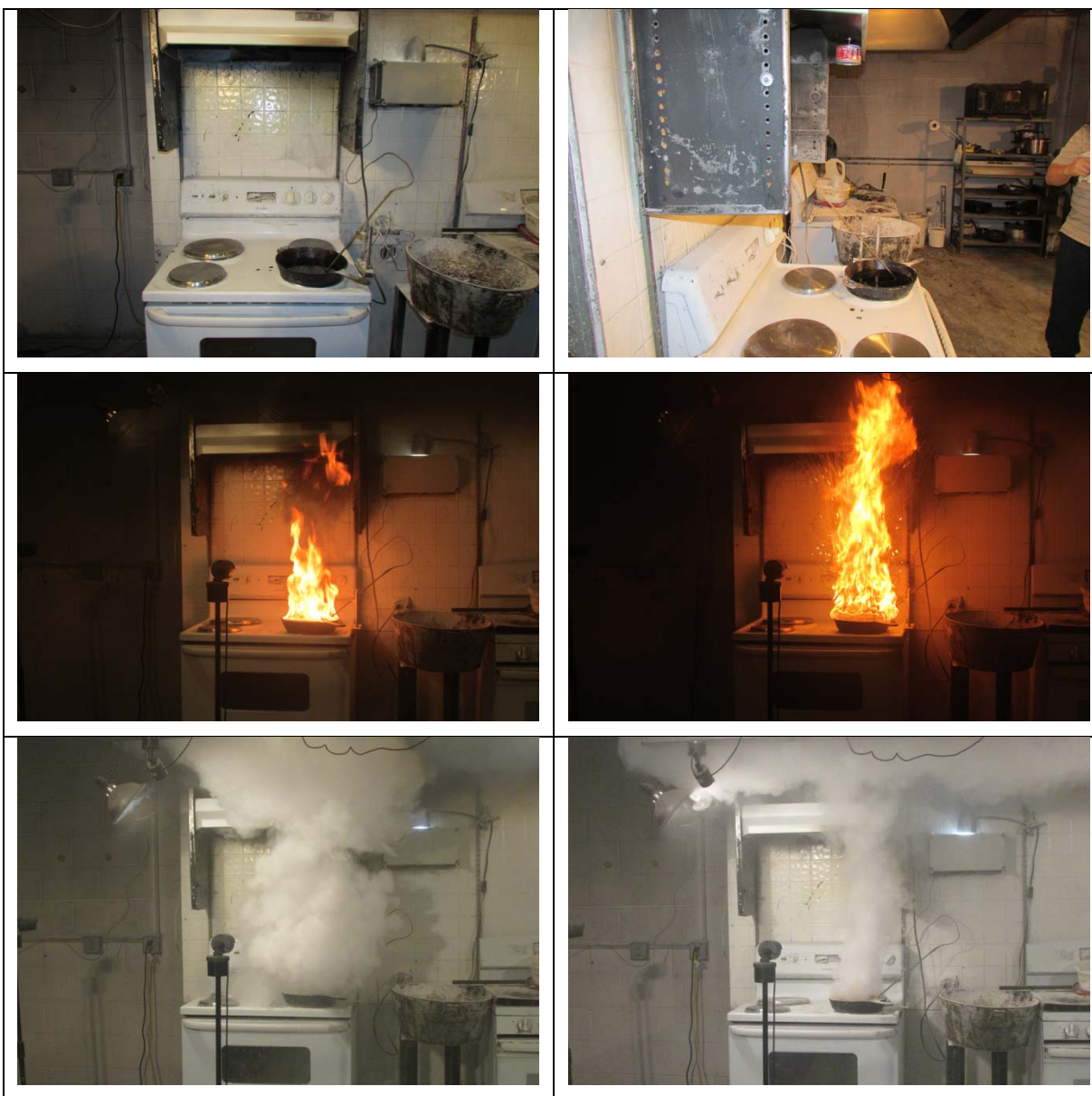


Figure 12. Selected Photographs from Test 6.



Figure 13. Selected Photographs from Test 7.



Figure 14. Selected Photographs from Test 8.

APPENDIX A
CLIENT-SUPPLIED PRODUCT DATA SHEET
(CONSISTING OF 2 PAGES)

- EN** Installation instructions in English.
Please leave these instructions with resident.
- ES** Instrucciones de instalacion en Español.
Porfavor deje estas instrucciones con el residente.
- FR** Instructions d'installation en Françaises
S.V.P. veuillez remettre aux résidents.

STOVETOP FIRESTOP[®]

RANGE HOOD

Automatic Residential Cooktop Fire Suppressor

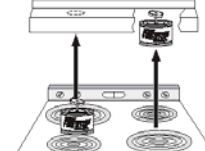
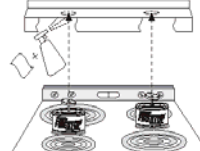
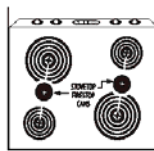
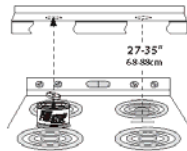


Warnings / Advertencias / Avertissements



- EN** This is a residential cooktop fire suppression device.
This product is not intended or approved for use with deep-fat frying.
A StoveTop FireStop unit is activated by sustained contact with direct flame. Normal cooking methods will not activate it.
After activation, turn off the stove's burner (if it is safe to do so). If the heat source (burner) is not immediately shut off after discharge, the fire may re-ignite.
Fire-suppressing powder is non-toxic, but may be harmful if swallowed and should not be ingested or exposed to eyes, mouth, open sores, etc. Seek medical attention if needed.
When activated, falling powder may cause grease fires to splash.
Keep out of reach of children.
Do not disassemble the unit or remove fuse. Manufacturer is not responsible for units that have been disassembled or tampered with in any way.
If more than a very small, controllable fire, get out of the dwelling, call 911 or the local emergency number, and pull the fire alarm or otherwise safely notify any other occupants. Close doors behind you to help contain fire.
- ES** Este es un dispositivo de supresión de fuego de cubierta residencial.
Este producto no es o aprobado para su uso con grasa de fritura.
Esta unidad de estufa anti fuegos es activada por el contacto continuado con llama directa. Método normal, de cocinar no va a activarse.
Después de la activación, apagar la hornilla de la estufa (si es seguro hacerlo).
Si la fuente de calor (quemador) aún no es inmediatamente apagada después de la descarga, puede encender el fuego.
Polvo de supresión de incendios no es tóxico, pero puede ser dañino si se ingiere y no debe ser ingerido o expuesto a los ojos, boca, llagas, etc.
Busque atención médica si es necesario.
Cuando se activa, la caída de polvo puede salpicar y causar incendios de grasa.
Mantener fuera del alcance de los niños.
No desarme la unidad o extraiga el fusible. Fabricante no es responsable de las unidades que han sido desmontadas o manipuladas de cualquier forma.
Si es más que un incendio pequeño y controlable, salir de la vivienda, llame al 911 o al número local de emergencia y estire la alarma de incendios o de lo contrario avisar con seguridad a otros ocupantes. Sierra la puerta después de usted para ayudar a contener el fuego.
- FR** Il s'agit d'un dispositif de suppression des incendies résidentiels pour la cuisson.
Ce produit n'est pas conçu ni approuvé pour une utilisation avec la friture à immersion.
Une unité de StoveTop FireStop est activée par un contact prolongé avec la flamme directe. Les méthodes de cuisson normales ne vont pas l'activer.
Après l'activation, éteindre le brûleur de la cuisinière (s'il est sécuritaire de le faire). Si la source de chaleur (brûleur) n'est pas coupée immédiatement après le déchargement, le feu peut se rallumer.
La poudre qui est à l'intérieur de l'extincteur n'est pas toxique, mais peut être nocif en cas d'ingurgitation et ne doit pas être avalée ou exposée auprès des yeux, de la bouche, ou des plaies ouvertes, etc. Consulter un médecin si nécessaire.
Lorsque l'extincteur est activé, la poudre qui se dégage peut causer des feux de graisse et peut éclabousser.
Tenir hors de la portée des enfants.
Ne pas démonter l'appareil ou retirer le fusible. Le fabricant n'est pas responsable des unités qui ont été démontées ou modifiées de quelque façon que se soit.
Si ce n'est plus un petit feu qui est contrôlable, sortir de la maison, composer le 911 ou le numéro d'urgence local, et tirer l'alarme d'incendie puis ensuite aviser en toute sécurité les autres occupants. Fermez les portes derrière vous pour aider à contenir le feu.

Installation Instructions / Instrucciones de instalacion / Instructions d'installation



- EN** Must have 27-35" (68-88 cm) between surface of cooktop and mounting point in range hood.
- ES** Tiene que haber 68-88 cm de espacio entre la superficie de la estufa y el punto de montaje en el sistema de ventilación.
- FR** Il doit y à avoir une distance de 68-88 cm de dégagement entre la surface de votre poêle et le point de montage dans la hotte.
- Cans must be mounted on a point in range hood centered between mid-points of front and back burners on each side
- Las latas deben montarse en un punto centrado entre los puntos medios de frente y parte posterior de los quemadores a cada lado de la campana.
- Les boîtes doivent être montés sur un point dans la hotte et doit être centrée entre les points médians des brûleurs avant et arrière de chaque côté.
- Clean and dry areas in vent hood where both magnets will attach.
- Limpie y seque las zonas en la campana donde los imanes van a ser colocados.
- Nettoyer et bien essuyer les secteurs dans la hotte où les deux aimants devront être attachés.
- Raise canisters by magnet to spot directly above in range hood.
- Coloque las unidades directamente en la campana de ventilación usando el imán.
- Soulevez l'unité par l'aimant pour repérer directement l'endroit situé en haut dans la hotte.

If the magnet does not attach, contact us for a free installation kit.
Si el imán no se conecta, contáctese con nosotros para obtener un kit de instalación.
Si l'aimant ne se fixe pas, contactez-nous pour avoir une trousse d'installation gratuite.

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Important Information / Información importante / Des informations importantes

EN Users must follow all instructions for StoveTop FireStop to function properly.
For indoor residential range hoods only.
Use one pair for each 4-burner cooktop.
Each unit must be replaced by the date on the label, after activation, or if opened or damaged.
Units do not need to be recharged or inspected by a fire service professional.
For storage and disposal information, or to learn more about StoveTop FireStop, please visit our website at www.stovetopfirestop.com or call 1-888-616-7976.
Designed and manufactured by Williams-Pyro, Inc., Fort Worth, TX, USA.

ES Usuarios deben seguir todas las instrucciones para que la unidad de estufa anti fuego funcione adecuadamente.
Para uso residencial interiores solamente.
Usted necesitará un par de latas para cada lado de la estufa.
Cada unidad debe ser reemplazada según la fecha indicada en la etiqueta o después de activarse.

La unidad no necesita recargarse ni ser inspeccionada por servicios de bomberos profesionales.

Para más información sobre eliminación o almacenamiento, o para saber más sobre StoveTop FireStop, puede visitar nuestro sitio Web www.stovetopfirestop.com o llame al 1-888-616-7976.

Diseñado y fabricado por Williams-Pyro, Inc., Fort Worth, TX, USA.

FR Les utilisateurs doivent suivre toutes les instructions pour que StoveTop FireStop fonctionne correctement.
Conçu pour les hottes d'intérieur et résidentiels seulement.
Une paire est nécessaire pour chaque poêle de 4 brûleurs.
Chaque boîte doit être remplacée soit à la date figurant sur l'étiquette ou après une activation.
Les boîtes n'ont pas besoin d'être rechargées ou inspectées par un professionnel du Service des Incendies.
Pour le remisage et les renseignements concernant l'élimination de ce produit, ou pour en savoir plus sur les StoveTop FireStop, visitez notre site Web au www.stovetopfirestop.com ou téléphonez 1-888-616-7976.
Conçu et fabriqué par Williams-Pyro, Inc, Fort Worth, TX, USA.

Fire Safety / Seguridad contra incendios / Sécurité Incendie

EN Cooking fires are the number one cause of residential fires and residential fire injuries. Unattended cooking is the leading cause of fires in the kitchen. Many injuries occur when occupants attempt to fight the fire themselves.

Never leave anything cooking on the stovetop unattended! Do not allow boiling over. If you have to leave the kitchen for even a short time, turn off the stove. Never leave home while you are cooking.

Never pick up a flaming pan! You may be burned, or if the pan is dropped, flames may quickly spread to other more flammable areas.

Never use water to fight a grease fire! A violent explosion may result. Wet dishcloths or towels are also dangerous.

Slide a tight-fitting lid or cookie sheet over the pan to smother the flames (only if it is safe to do so). Turn off burner and wait 20 minutes before removing lid.

ES Cocinar son la causa número uno de incendios residenciales y lesiones de incendios residenciales.

Cocción desatendida es la principal causa de incendios en la cocina.

Muchas lesiones ocurren cuando ocupantes intentan combatir el incendio ellos mismos.

Nunca deje nada cocinando en la estufa nada desatendido. No deje hervir. Si tienes que dejar la cocina para incluso un poco de tiempo, apague la estufa.

Nunca salga de casa mientras usted está cocinando. Nunca levante una olla en llamas! Se puede quemar, o si se cae la olla, las llamas rápidamente pueden

extenderse a otras áreas más inflamables.

Nunca utilice agua para combatir un incendio de grasa!

Puede provocar una explosión violenta. Paños o toallas también son peligrosos.

Deslice una tapa de cierre hermético o de galletas sobre la bandeja para apagar las llamas (sólo si es seguro hacerlo). Apague el quemador y espere 20 minutos antes de retirar la tapa.

FR Les feux de cuisson sont la première cause d'incendies résidentiels ainsi que les blessures causées par ces incendies. La cuisson sans surveillance est la principale cause d'incendies dans une cuisine. De nombreux accidents se produisent lorsque les occupants tentent de lutter contre le feu eux mêmes.

Ne jamais laisser sans surveillance quoi que ce soit sur la cuisinière! Ne laissez pas les casseroles déborder. Si vous devez quitter la cuisine même pour un court laps de temps, éteignez la cuisinière. Ne jamais quitter la maison pendant que vous cuisinez.

Ne prenez jamais une casserole enflammée! Vous pourriez vous brûler, ou si la casserole a tombée, les flammes peuvent se propager rapidement vers des zones plus inflammables.

Ne jamais utiliser d'eau pour éteindre un feu de graisse! Une violente explosion peut en résulter. Des serviettes ou un linge mouillés sont également très dangereux.

Faites glisser un couvercle hermétique ou une plaque à biscuits sur la casserole afin d'éteindre les flammes (seulement s'il est sécuritaire de le faire). Éteindre le brûleur et attendre 20 minutes avant de retirer le couvercle.

Limited Warranty

Williams-Pyro, Inc. ("WPI") warrants this StoveTop FireStop® product against defects in material or workmanship for the time periods and under the terms set forth below. Pursuant to this Limited Warranty, WPI will, at its option, (i) repair the product using new or refurbished parts or (ii) replace the product with a new or refurbished product. For purposes of this Limited Warranty, "refurbished" means a product or part that has been returned to its original specifications. **In the event of a defect, these are your exclusive remedies.**

WPI warrants to the original retail purchaser all WPI products for a period of one (1) year against defective material and faulty workmanship. Any unit found to be defective during the warranty period will be repaired if possible, or replaced free of charge upon the buyer's prepaid return of the defective unit—only after receipt of an official Return Material Authorization (RMA) number. Proof of retail purchase is required. This warranty gives the buyer specific legal rights which may vary by state (or country).

THE FORGOING WARRANTY IS MADE IN LIEU OF ALL OTHER WARRANTIES WITH RESPECT TO THIS PRODUCT, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE—WHICH ARE HEREBY DISCLAIMED. THERE ARE NO IMPLIED WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF. NO PERSON IS AUTHORIZED TO GIVE ANY OTHER WARRANTY, OR TO ASSUME FOR WPI ANY OTHER LIABILITY IN CONNECTION WITH THE SALE OR INSTALLATION OF ITS PRODUCTS. REPLACEMENT OF THE PRODUCT WILL BE THE SOLE REMEDY WITH RESPECT TO ANY LOSS OR DAMAGE TO PROPERTY. BUYER IS NOT RELYING ON SELLER'S

JUDGMENT REGARDING BUYER'S PARTICULAR REQUIREMENTS AND BUYER HAS HAD AN OPPORTUNITY TO INSPECT THE PRODUCT TO BUYER'S SATISFACTION. UNAUTHORIZED SERVICE OF ANY KIND INVALIDATES ALL WARRANTY PROVISIONS.

This Limited Warranty covers only the hardware components packaged with this product. It does not cover technical assistance for hardware. Any parts or product replaced under this Limited Warranty will become the property of WPI.

LIMITATION ON DAMAGES: WPI SHALL NOT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO ANY SUCH DAMAGES FOR ANY BREACH OF ANY EXPRESS OR IMPLIED WARRANTY ON THIS PRODUCT.

Instructions: To obtain warranty service, you must deliver the product, freight prepaid, in either its original packaging, or packaging affording an equal degree of protection, to WPI's specified manufacturing facility.

This Limited Warranty only covers product issues caused by defects in material or workmanship during ordinary consumer use; it does not cover product issues caused by any other reason, including but not limited to product issues due to commercial use, acts of God, misuse, limitations of technology, or modification of or to any part of the WPI product. This Limited Warranty is invalid if either the factory-applied work order number or date code has been altered or removed from the product. This Limited Warranty is valid only in the United States.

For StoveTop FireStop customer service, go to www.stovetopfirestop.com or call 1-888-616-7976.