UL 1046

STANDARD FOR SAFETY

Grease Filters for Exhaust Ducts

UL Standard for Safety for Grease Filters for Exhaust Ducts, UL 1046

Fourth Edition, Dated February 5, 2010

SUMMARY OF TOPICS

This revision of ANSI/UL 1046 is being issued to update the title page to reflect reaffirmation of ANSI approval.

Text that has been changed in any manner or impacted by UL's electronic publishing system is marked with a vertical line in the margin.

The requirements are substantially in accordance with Proposal(s) on this subject dated January 27, 2017.

The following table lists the future effective dates with the corresponding reference.

Future Effective Dates	References
August 6, 2012	Entire Standard

No Text on This Page

FEBRUARY 5, 2010
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UL 1046

Standard for Grease Filters for Exhaust Ducts

First Edition – December, 1974
Second Edition – July, 1979
Third Edition – March, 2000

Fourth Edition

February 5, 2010

This ANSI/UL Standard for Safety consists of the Fourth edition including revisions through April 17, 2017.

The most recent designation of ANSI/UL 1046 as a Reaffirmed American National Standard (ANS) occurred on March 22, 2017. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, and Title Page. Any other portions of this ANSI/UL standard that were not processed in accordance with ANSI/UL requirements are noted at the beginning of the impacted sections.

Comments or proposals for revisions on any part of the Standard may be submitted to UL at any time. Proposals should be submitted via a Proposal Request in UL's On-Line Collaborative Standards Development System (CSDS) at https://csds.ul.com.

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INTRODUCTION

1 Scope

1.1 Products covered by these requirements are single-stage and multi-stage grease filters. These grease filters are intended for installation and use in accordance with the Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations, NFPA No. 96 and the International Mechanical Code (IMC).

1.1 effective August 6, 2012

1.2 Grease extraction devices integral to the exhaust hoods that use them and other filter devices designed to be used in only the specific manufacturer's hoods are not covered by this standard but are tested under the Standard for Exhaust Hoods for Commercial Cooking Equipment, UL 710, or the Standard for Recirculating Systems, UL 710B, or the Outline for Ultraviolet Radiation Systems for Use in the Ventilation Control of Commercial Cooking Operations, Subject 710C.

1.2 effective August 6, 2012

1.3 The test methods described in this standard pertain to filters used in exhaust hoods for commercial cooking operations. The primary function of these devices and the capability of devices tested in this standard are to prevent flames from penetrating into the exhaust system beyond the hood collar. The terms grease and oil are used interchangeably in this standard

1.3 effective August 6, 2012

1.4 Filters are investigated to determine their abilities to:

a) Limit the projection of flames downstream when subjected to flames on the upstream face, after having been loaded with grease in a manner representative of cooking that produces a grease-rich exhaust,

b) Drain any collected grease in such a manner that it does not fall back onto the cooking surface.

1.4 effective August 6, 2012

1.5 The standard does not measure capture efficiency or physical robustness of the grease filter device or other factors that do not directly affect user or fire safety.

Note: Capture efficiency of a kitchen hood filter can be measured using ASTM F2519 "Standard Test Method for Grease Particle Capture Efficiency of Commercial Kitchen Filters and Extractors".

1.5 effective August 6, 2012

2 Components

2.1 Except as indicated in these requirements, a component of a product covered by this standard shall comply with the requirements for that component.

2.1 effective August 6, 2012

2.2 A component is not required to comply with a specific requirement that:

a) Involves a feature or characteristic not required in the application of the component in the product covered by this standard, or

b) Is superseded by a requirement in this standard.

2.2 effective August 6, 2012

2.3 A component shall be used in accordance with its rating established for the intended conditions of use.

2.3 effective August 6, 2012

2.4 Specific components are incomplete in construction features or restricted in performance capabilities. Such components are intended for use only under limited conditions, such as certain temperatures not exceeding specified limits, and shall be used only under those specific conditions.

2.4 effective August 6, 2012

3 Units of Measurement

3.1 Values stated without parentheses are the requirement. Values in parentheses are explanatory or approximate information.

3.1 effective August 6, 2012

4 Undated References

4.1 Any undated reference to a code or standard appearing in the requirements of this standard shall be interpreted as referring to the latest edition of that code or standard.

4.1 effective August 6, 2012

5 Glossary

5.1 For the purpose of this standard the following definitions apply.

5.1 effective August 6, 2012

5.2 FILTER-FACE AREA – The overall height times the overall width.

5.2 effective August 6, 2012

5.3 INTEGRAL GREASE EXTRACTION DEVICES – are integral to the exhaust hoods that use them and typically contain a series of horizontal baffles that run the full length of the hood. The baffles are not removable for cleaning and a wash system is provided. Some hoods have doors that can be opened or removed to clean the grease extractors.

5.3 effective August 6, 2012

5.4 NON-COMBUSTIBLE – A material that, in the form in which it is used and under the conditions anticipated, will not ignite, burn, support combustion, or release flammable vapors when subjected to fire or heat.

5.4 effective August 6, 2012

5.5 NORMAL HANDLING – The insertion, removal and cleaning of the grease extraction device.

5.5 effective August 6, 2012

5.6 REMOVABLE GREASE EXTRACTORS – (also called cartridge filters) typically have a single horizontal slot air inlet. The cartridge filters are arranged in a channel or bracket for easy insertion and removal for cleaning. Removable grease extractors may be evaluated under this standard or may be evaluated as part of the hood construction under the Standard for Exhaust Hoods for Commercial Cooking Equipment, UL 710.

5.6 effective August 6, 2012

CONSTRUCTION

6 General

6.1 Any part of a grease filter that normally comes in contact with the user's hands during normal handling shall be free from sharp edges or sharp projections.

6.1 effective August 6, 2012

6.2 Parts of grease filters that are exposed to cooking effluent shall be constructed of non-combustible materials.

6.2 effective August 6, 2012

PERFORMANCE

7 General

7.1 Grease filter constructions that are not symmetrical from front to rear (inlet to outlet), side to top, or bottom to top, shall be tested mounted as intended and again when mounted in reverse. Markings alone are not considered sufficient to prevent reverse installation.

Exception No. 1: If handles are permanently attached to one face, no handholds are attached to the opposite face.

Exception No. 2: Constructions that - by their shape or mounting attachment to the exhaust hood - limit the installation from front to rear (inlet to outlet) to one direction.

7.1 effective August 6, 2012

7.2 Multi-stage grease filters or grease filter systems consisting of two or more discrete components shall be evaluated as follows:

a) When installed as intended, the grease filter system shall be subjected to the Grease Loading Test, Section 8 and the Flame Exposure Test, Section 9, and

b) Each stage shall be subjected individually to the Grease Loading Test, Section 8 and the Flame Exposure Test, Section 9, if it can be installed without the adjacent stage(s) attached.

7.2 effective August 6, 2012

8 Grease Loading Test

8.1 General

8.1.1 During the final 15 minutes of the grease loading test, there shall be no evidence that any of the grease collected on the filter falls back onto the cooking surface.

Exception: One drip per every 20 seconds can fall from mounting handles.

8.1.1 effective August 6, 2012

8.1.2 When drainage occurs, drainage from the filters must be made evident by observing grease drained into the grease trough and/or grease cup.

8.1.2 effective August 6, 2012

8.1.3 A filter shall not warp, or otherwise be damaged to an extent that it can not be easily inserted into or removed from the hood.

8.1.3 effective August 6, 2012

8.2 Loading test equipment

8.2.1 Test hood

8.2.1.1 A hood conforming to the requirements of Standard for Exhaust Hoods for Commercial Cooking Equipment, UL 710 shall be used.

8.2.1.1 effective August 6, 2012

8.2.1.2 The hood shall have a collar connecting to a square or circular exhaust duct with a cross sectional area of 256 square inches (1652 square cm). The duct shall be centered on the length of the hood and shall be located 0 to 2 inches (0 - 51 mm) from the back wall of the exhaust hood plenum.

8.2.1.2 effective August 6, 2012

8.2.1.3 The exhaust system shall be provided with a means to vary the air flow volume through the grease removal devices. Any device located in the exhaust duct system shall be located a minimum of 48 inches (122 cm) from the duct connection to the hood.

8.2.1.3 effective August 6, 2012

8.2.1.4 The exhaust hood shall be a minimum of 40 inches (101.6 cm) long and a maximum of 48 inches (122 cm) long.

8.2.1.4 effective August 6, 2012

8.2.1.5 The exhaust plenum shall be a minimum of 22 inches (56 cm) deep and a maximum of 24 inches (61 cm) deep.

8.2.1.5 effective August 6, 2012

8.2.1.6 The hood shall be provided with a trough(s) and a collector cup capable of holding all drainage from the filters collected during the entire test period.

8.2.1.6 effective August 6, 2012

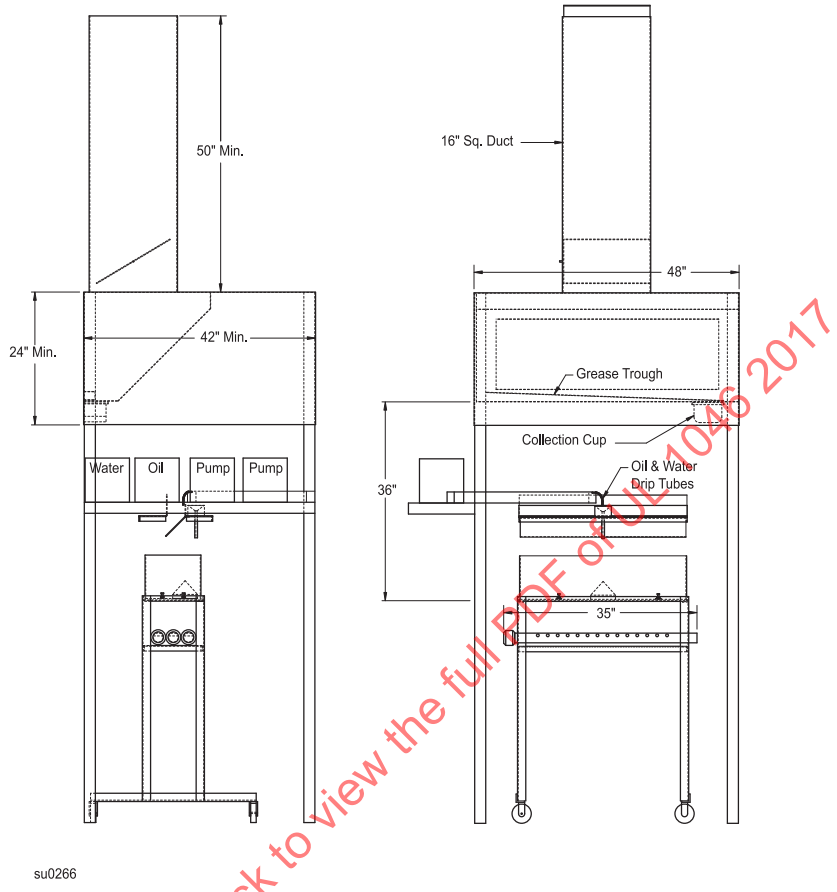
8.2.2 Mounting of filters

8.2.2.1 Filters shall be as close in size as available to 20 inches (50.8 cm) high and 20 inches (50.8 cm) wide. They shall be mounted 45 +5/-0 degrees from the horizontal. Two filters shall be tested side-by-side. See Figure 8.1.

8.2.2.1 effective August 6, 2012

Figure 8.1
Test hood and apparatus

Figure 8.1 effective August 6, 2012



Conversion Factors	
Inch	**(mm)**
16	(406)
24	(610)
35	(889)
36	(914)
42	(1067)
48	(1219)
50	(1270)

NOTES:

1. Hood shall comply with UL 710 and NFPA 96.

2. Oil and water delivery system must be capable of feed rates specified in 8.2.3.3.

3. An adjustable damper or fan speed control must be used. If a damper is installed, it must be at least 48” above the joint between the hood and duct.

8.2.2.2 Grease filters smaller than 20 inches (50.8 cm) in height or width may be used if the construction will not include 20 inch (50.8 cm) filters. Adapter(s) shall be provided to close the 20 by 40 inch (50.8 by 101.6 cm) opening in the hood. The adapters shall be located at the top or outside edges of the grease removal device. See Figure 8.1.

8.2.2.2 effective August 6, 2012

8.2.2.3 Filters to be tested shall fit into the hood tightly together to assure that all flow is through the filters.

8.2.2.3 effective August 6, 2012

8.2.2.4 The filters shall be sealed to each other and to the plenum or filter supports with aluminum duct tape or sealants that will remain in place and be air tight throughout the tests.

8.2.2.4 effective August 6, 2012

8.2.3 General

8.2.3.1 The hood shall be designed and constructed to capture and convey the test effluent through the filters during the loading test. Panels or extensions may be added to the sides, front or rear of the hood to prevent any spillage of the test effluent.

8.2.3.1 effective August 6, 2012

8.2.3.2 The filter Loading Pan shall be constructed as shown in Figures 8.2 and 8.3.

8.2.3.2 effective August 6, 2012

8.2.3.3 The grease loading system shall include a chamber as shown in Figures 8.2 and 8.3 and an oil and water delivery system capable of producing a flow into the loading pan at a rate of 10 ±0.5 and 24.5 ±0.5 ml/minute (0.338 and 0.828 fl oz/min) for oil and water respectively throughout the test.

8.2.3.3 effective August 6, 2012

8.2.3.4 A heat source capable of maintaining a temperature of the pan, as determined by iron-constantan (J type) or chromal-alumel (k type) thermocouples located per Figure 8.2, in the range of 725 ±25°F (385 ±14°C) throughout the test shall be provided.

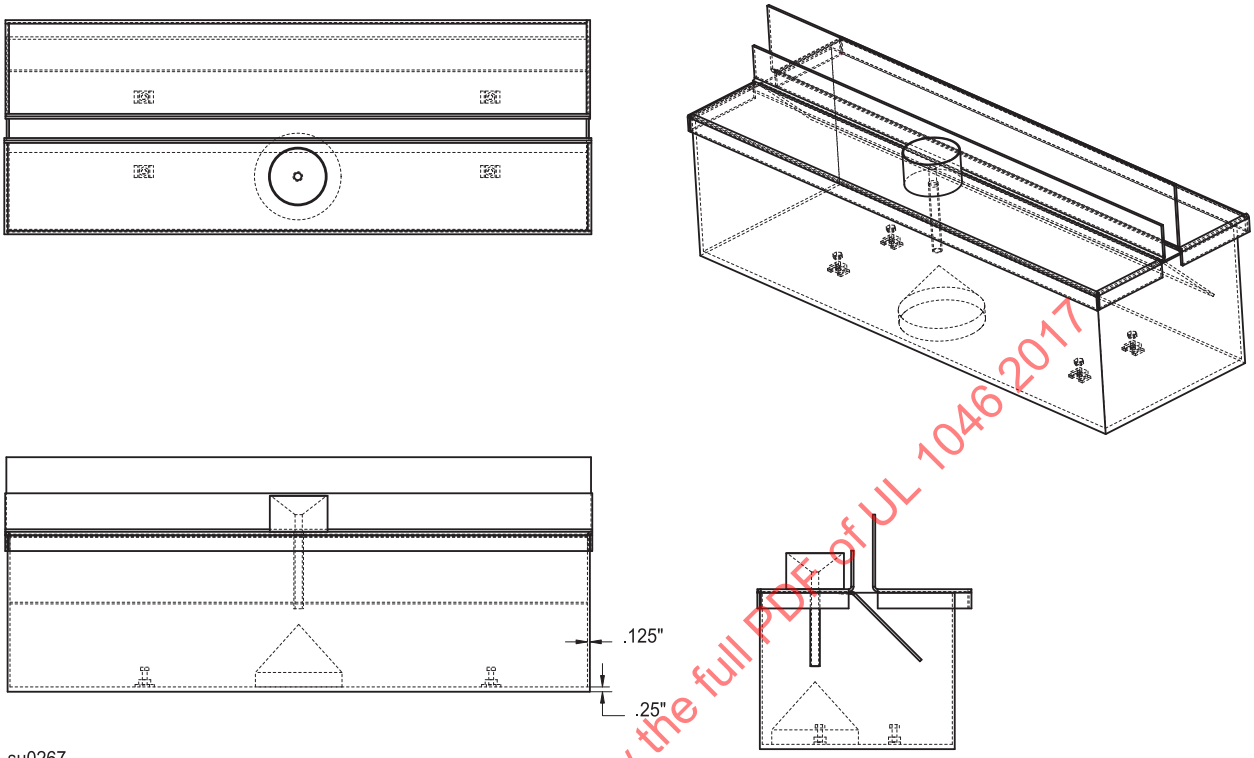
8.2.3.4 effective August 6, 2012

8.2.3.5 Soybean oil 7.68 lbs/gal (0.92 g/ml) shall be used as the loading material. It is closely representative in physical and chemical properties of the compounds emitted during cooking.

8.2.3.5 effective August 6, 2012

Figure 8.2
Vapor box and covers

Figure 8.2 effective August 6, 2012



Conversion Factors	
Inch	**(mm)**
0.125	(3.2)
0.25	(6.3)

NOTES:

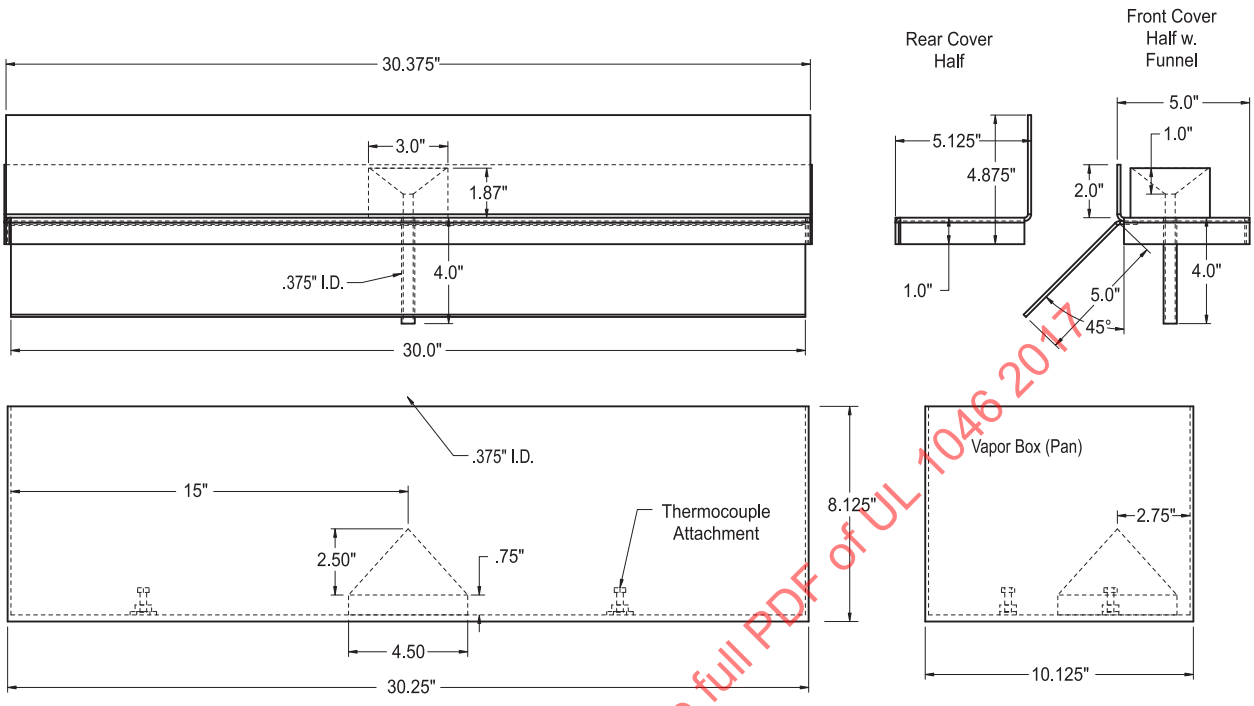
1. Weld thermocouple hardware to bottom on inside of box.

2. Use J-type thermocouples.

3. Sides and ends thickness is 0.125 in (3.2 mm). Bottom thickness is 0.25 in (6.3 mm).

Figure 8.3
Vapor box and covers

Figure 8.3 effective August 6, 2012



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Conversion Factors					
Inch	**(mm)**	**Inch**	**(mm)**	**Inch**	**(mm)**
0.375	(9.5)	2.75	(69.8)	5.125	(130)
0.75	(19.0)	3.0	(76.2)	8.125	(206)
1.0	(25.4)	4.0	(102)	10.125	(257)
1.87	(47.6)	4.5	(114)	30.0	(762)
2.0	(50.8)	4.875	(124)	30.25	(768)
2.50	(63.5)	5.0	(127)	30.375	(772)

8.3 Loading Test Method

8.3.1 The test filters shall be installed in the hood and adjusted to an initial exhaust airflow of 200 to 300 cfm (5663 to 8495 L/min) per linear foot (304.8 mm) of filter length. If the hood does not capture effluent with side panels/skirts in-place, increase the airflow to a sufficient level to allow for capture.

8.3.1 effective August 6, 2012

8.3.2 The two-piece pan cover is to be positioned on the pan with the funnel centered over the cone and to provide an opening about 1.5 inches (38.1 mm) wide by 30 inches (762 mm) long.

8.3.2 effective August 6, 2012

8.3.3 The loading pan shall be preheated to 725 ±25°F (385 ±14°C) followed by activation of the dripping flow into the loading pan at a rate of 10 ±0.5 and 24.5 ±0.5 ml/minute (0.338 and 0.828 fl oz/min) for oil and water respectively. The loading system must operate throughout the loading period at this flow rate and in this temperature range.

8.3.3 effective August 6, 2012

8.3.4 For filters made completely of a material having a non-absorbing surface, load the samples for a minimum of 2 hours or until there is evidence of grease draining from the filter which ever is longer.

8.3.4 effective August 6, 2012

8.3.5 For filters that absorb grease or for filters with multiple stages, load the filters for 6 hours.

8.3.5 effective August 6, 2012

8.3.6 With regard to 8.3.4 and 8.3.5:

a) During the first and last 30 minutes of the loading period record any dripping of oil from the filters.

b) Repeat the loading for a second set of filters.

8.3.6 effective August 6, 2012

8.3.7 When the heat source is turned off at the end of the loading period, the units are to remain in the hood, with air flowing through them, for 30 minutes. Then each set of filters is to be subjected to the Flame Exposure test method, 9.3, as soon as practical.

8.3.7 effective August 6, 2012

9 Flame Exposure Test

9.1 General

9.1.1 During the flame exposure test no flame extension greater than 18 inches (457.2 mm) beyond the downstream face of the filter shall be evident.

9.1.1 effective August 6, 2012

9.1.2 Flame extension beyond 18 inches (457.2 mm) in 9.1.1 is defined as a single interval longer than 1.0 second and/or multiple individual intervals of any duration exceeding 20.0 cumulative seconds.

9.1.2 effective August 6, 2012

9.1.3 A filter shall remain intact throughout the test and shall not warp or otherwise be damaged to an extent that it cannot be easily inserted into or removed from the hood.

Revised 9.1.3 effective August 6, 2012

9.1.4 The units used in the Grease Loading Test are to be inserted in the test duct and exposed to the test flame as described in 9.3.

9.1.4 effective August 6, 2012

9.2 Flame test equipment

9.2.1 The apparatus for this test shall include a horizontal duct provided with a means to mount the filter previously subjected to the grease loading test. The loaded filter shall be exposed to a natural gas flame or a technical grade methane gas of known heat content between 1000 – 1050 BTU/cubic foot (37.3 – 39.1 MJ/m^3) carried in a controlled-velocity air flow.

9.2.1 effective August 6, 2012

9.2.2 The upstream duct section shall be equipped with a vane inlet diffuser to assure a uniformly distributed flow immediately ahead of the test filter location.

9.2.2 effective August 6, 2012

9.2.3 The filter must be sealed into the duct so all flow is through the filter and there is no leakage around the filter.

9.2.3 effective August 6, 2012

9.2.4 The apparatus is to include an observation port to enable recording any flame extension from the downstream face of the filter.

9.2.4 effective August 6, 2012

9.2.5 The apparatus shall include a device to measure air velocity that is capable of meeting the requirements of 9.3.2.

9.2.5 effective August 6, 2012

9.2.6 A video camera shall be mounted as shown in Figure 9.1 to record, through the viewing port, any flame penetration. The video camera must be capable of displaying a time track in seconds during playback.

9.2.6 effective August 6, 2012