UL Evaluation Report

UL ER4339-02

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UL Category Code: ULFE

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DIVISION: 07 00 00 – THERMAL AND MOISTURE PROTECTION
Sub-level 2: 07 80 00 – Fire and Smoke Protection
Sub-level 3: 07 81 00 – Applied Fireproofing
Sub-level 4: 07 81 16 – Cementitious Fireproofing

COMPANY:

GCP Applied Technologies
Fire Operating Unit
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Cambridge, MA 02140
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1. SUBJECT:

Product Trade Name	UL Product Designation
MONOKOTE® MK-6®/GF	Type MK-6 GF
MONOKOTE® MK-6®/HY®	Type MK-6/HY
MONOKOTE® MK-6®/HY® EXTENDED SET (MK-6/HY ES)	Type MK-6/HY Extended Set
MONOKOTE® MK-6s	Type MK-6s
MONOKOTE® MK-10/HB	Type MK-10 HB
MONOKOTE® MK-10/HB EXTENDED SET (MK-10/HB ES)	Type MK-10 HB Extended Set
MONOKOTE® MK-1000/HB	Type MK-1000/HB
MONOKOTE® MK-1000/HB EXTENDED SET (MK-1000/HB ES)	Type MK-1000/HB Extended Set
RETRO-GUARD® RG	Type RG
MONOKOTE® Z-106/HY®	Type Z-106/HY
MONOKOTE® Z-106/G	Type Z-106/G

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Product Trade Name	UL Product Designation
MONOKOTE® Z-146	Type Z-146
MONOKOTE® Z-146T	Type Z-146T
MONOKOTE® Z-156	Type Z156
MONOKOTE® Z-156T	Type Z-156T
Spatterkote SK-3	Type SK-3
Monokote Accelerator	-
Firebond Concentrate	-
Monokote Patching Compound	Monokote Patching Compound

2. SCOPE OF EVALUATION

- 2015, 2012, 2009, 2006 *International Building Code*® (IBC)
- 2015, 2012, 2009, 2006 *International Mechanical Code*® (IMC)
- ICC-ES Acceptance Criteria for Sprayed Fire-Resistant Materials (SFRMs), Intumescent Fire-Resistant Coatings and Mastic Fire-Resistant Coatings Used to Protect Structural Steel Members (AC23), dated December 2012
- ICC-ES Acceptance Criteria for Quality Documentation (AC10), dated June 2014

The products were evaluated for the following properties:

- Fire Resistance (ANSI/UL 263, ASTM E119)
- Surface Burning Characteristics (ANSI/UL 723, ASTM E84)
- Cohesive / adhesive bond (ASTM E736)
- Deflection (ASTM E759)
- Impact Resistance (ASTM E760)
- Compressive Strength (ASTM E761)
- Air-stream Resistance (ASTM E859)
- Mold Growth and Humidity Resistance (ASTM G21)
- Environmental Exposures (ANSI/UL 263, ASTM E119)

3. REFERENCED DOCUMENTS

- ANSI/UL 263, 14th Ed. (ASTM E119), Fire Tests of Building Construction and Materials
- ANSI/UL 723, 10th Ed. (ASTM E84), Test for Surface Burning Characteristics of Building Materials
- ASTM E736-00 (2011), Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members
- ASTM E759-92 (2011), Standard Test Method for Effect of Deflection on Sprayed Fire-Resistive Material Applied to Structural Members
- ASTM E760-92 (2011), Standard Test Method for Effect of Impact on Bonding of Sprayed Fire-Resistive Material Applied to Structural Members
- ASTM E761-92 (2011), Standard Test Method for Compressive Strength of Sprayed Fire-Resistive Material Applied to Structural Members
- ASTM E859-93 (2011), Standard Test Method for Air Erosion of Sprayed Fire-Resistive Materials (SFRMs) Applied to Structural Members
- ASTM G21-09, Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi

4. USES

Monokote® MK-6/GF, MK-6/HY, MK-6/HY Extended Set (MK-6/HY ES, MK-6s, MK-10/HB, MK-10/HB Extended Set (MK-10/HB ES), MK-1000/HB, MK-1000/HB Extended Set (MK-1000/HB ES), Z-106/HY, Z-106/G, Z-146, Z-146T, Z-156, Z-156T, and Retro-Guard® RG are spray-applied cementitious fire-resistive materials intended for fire-resistance-rated applications on structural steel framing members in various concrete or steel roof-ceiling and floor-ceiling systems.

The SFRMs covered in this report are also approved for use in plenums, in accordance with 2015, 2012, 2009, and 2006 IMC Section 602.2.1.

Spatterkote SK-3, Monokote Accelerator, and Firebond Concentrate are additional materials that may be used in conjunction with the Monokote® products, to aid in the application process.

5. PRODUCT DESCRIPTION

5.1 General:

Monokote® MK-6/GF, MK-6/HY, MK-6/HY Extended Set (MK-6/HY ES), MK-6s, MK-10/HB, MK-10/HB Extended Set (MK-10/HB ES), MK-1000/HB, and MK-1000/HB Extended Set (MK-1000/HB ES) are standard-density spray-applied fire resistive materials (SFRMs) intended for use in new construction. Retro-Guard® RG is a standard density spray-applied fire resistive material used in re-spray or replacement applications.

Monokote® Z-106/HY and Z-106/G are medium density spray-applied fire resistive materials intended for use in new construction applications.

Monokote® Z-146, Z-146T, Z-156, and Z-156T are high density spray-applied fire resistive materials that are acceptable for use in exterior locations. The designations with T have an integral corrosion inhibitor for use in harsh environmental conditions.

Spatterkote SK-3 is a cementitious spray-applied fire resistive material that is applied prior to specific SFRM products, on certain galvanized steel floor and roof units, as shown in the appropriate UL Fire-Resistive Designs listed on the CHPX.R4339 Classification Card.

Monokote Accelerator is an optional set accelerator that can be mixed with the Monokote® MK-6/GF, MK-6/HY, MK-6/HY ES, MK-6s, MK-10/HB, MK-10/HB ES, MK-1000/HB, MK-1000/HB ES, Retro-Guard® RG, Z-106/HY, and Z-106/G SFRM products.

Firebond Concentrate is a material that may be applied prior to the Monokote® MK-6/HY, MK-6s, MK-10 HB, MK-10/HB ES, Z-106/HY, and Retro-Guard® RG products, as a bonding agent on concrete surfaces and primed structural members or as an encapsulant over the finished surface of the Monokote® MK-6/GF, MK-6/HY, MK-6/HY Extended Set (MK-6/HY ES), MK-6s, MK-10/HB, MK-10/HB Extended Set (MK-10/HB ES), MK-1000/HB, MK-1000/HB Extended Set (MK-1000/HB ES), Z-106/HY, Z-106/G, Z-146, Z-146T, Z-156, Z-156T, and Retro-Guard® RG SFRM.

The SFRMs covered in this report have a flame spread index of 25 or less and a smoke developed index of 50 or less when tested in accordance with ANSI/UL 723 (ASTM E84).

The following table summarizes the minimum average and minimum individual required densities for each product covered in this report:

Product Trade Name	Minimum Average Density (pcf)	Minimum Individual Density (pcf)
MONOKOTE® MK-6/GF	15	14
MONOKOTE® MK-6/HY	15	14
MONOKOTE® MK-6/HY EXTENDED SET (MK-6/HY ES)	15	14
MONOKOTE® MK-6s	15	14
MONOKOTE® MK-10/HB	15	14
MONOKOTE® MK-10/HB EXTENDED SET (MK-10/HB ES)	15	14
MONOKOTE® MK-1000/HB	18	17
MONOKOTE® MK-1000/HB EXTENDED SET (MK-1000/HB ES)	18	17
RETRO-GUARD® RG	15	14
MONOKOTE® Z-106/HY	22	19
MONOKOTE® Z-106/G	22	19
MONOKOTE® Z-146	40	36
MONOKOTE® Z-146T	40	36
MONOKOTE® Z-156	50	45
MONOKOTE® Z-156T	50	45

6. INSTALLATION

6.1 General:

The SFRMS covered in this report must be installed in accordance with this report and the manufacturer's published installation instructions, which must be available during installation at the jobsite.

The SFRMs are mill-mixed and machine-applied, using one or more coats to achieve the required thickness. To ensure an accurate spray pattern, air pressure and pumping rates shall be adjusted accordingly. The products may be hand-patched using the guidelines outlined in the UL CHPX.R4339 Classification Card. The thickness and densities of each product shall comply with the requirements of the various assemblies and applications as specified in the corresponding designs listed on the CHPX.R4339 Classification Card. The materials shall be applied quickly after mixing, without re-tempering. The equipment and mixer shall be kept clean prior to mixing the material.

The Monokote® MK-6/GF, MK-6/HY, MK-6/HY ES, MK-6s, MK-10/HB, MK-10/HB ES, MK-1000/HB, MK-1000/HB ES, Retro-Guard® RG, Z-106/HY, and Z-106/G SFRM products covered in this report may be injected with Monokote Accelerator in the field, to aid in product yield and the setting process.

6.2 Preparation of Substrate for SFRM Application

Prior to application, the substrate to receive the SFRMs shall be free of any substances or conditions that interfere with adhesion of the material, in accordance with 2015, 2012, 2009 IBC Section 704.13.3. Primers, paints, and encapsulants are allowed, provided they comply with 2015, 2012, 2009 IBC Sections 704.13.3.1 and 704.13.3.2.

Spatterkote SK-3 shall be “spatter” applied to the substrate prior to the SFRMS installed in accordance with the corresponding Fire-Resistive Designs as shown in the CHPX.R4339 Classification Card. Thickness of the Spatterkote SK-3 is included in the total final thickness of the SFRM.

Firebond Concentrate is an encapsulant material that may be used with Monokote® MK-6/GF, MK-6/HY, MK-6/HY Extended Set (MK-6/HY ES), MK-6s, MK-10/HB, MK-10/HB Extended Set (MK-10/HB ES), MK-1000/HB, MK-1000/HB Extended Set (MK-1000/HB ES), Z-106/HY, Z-106/G, Z-146, Z-146T, Z-156, Z-156T, and Retro-Guard® RG applied at 500 ft^2/gal. Firebond Concentrate shall be applied to primed or painted surfaces as a bonding agent for SFRMs to obtain the minimum bond strengths in the field as required by 2015, 2012, 2009 IBC Section 704.13.3.2(4).

If minimum bond strengths are not met at the jobsite, and for wide flange and certain HSS structural steel shape dimensions that do not meet the conditions specified in 2015, 2012, 2009 IBC Section 704.13.3.2 for allowing primers, paints, and encapsulants at the jobsite, a mechanical break is required. Refer to the various UL Fire-Resistive Designs in the CHPX.R4339 Classification Card, as well as the Guide Information Card for UL Category Code BXUV for specific requirements on the required mechanical break to facilitate the spray application of SFRMs.

6.3 Fire Resistive Assemblies

The SFRMs covered in this report shall be installed as specified in one or more of the UL Fire-Resistive Designs as listed in the CHPX.R4339 Classification Card, for each of the corresponding SFRMs. Refer to the table in Section 1 of this report for the UL Product Designation for each Trade Name.

6.4 Thickness Tolerances

The minus tolerance of the SFRM thickness must be no greater than 1/4 inch, or 25% of a design thickness of less than 1 inch. When applicable, additional material must be applied to meet this tolerance.

When an individually measured SFRM thickness exceeds the design thickness by 1/4 inch or more, the thickness shall be recorded as the design thickness plus 1/4 inch.

6.5 Special Inspections for SFRMs

Special inspections are required for the SFRMs covered in this report, in accordance with 2015 IBC Section 1705.14, 2012 IBC Section 1705.13, 2009 IBC Section 1704.12, or 2006 IBC Section 1704.10.

6.6 SFRMs Recognized for Exterior Use: Physical Property Requirements

Monokote® Z-146, Z-146T, Z-156, and Z-156T have been evaluated for exterior use in accordance with AC23 and may be applied on exposed structural shapes less than 8 ft (2438 mm) from a floor, landing, or occupied space.

Where the applied SFRMs are subject to impact damage, they shall be protected with corner guards or any other substantial jacket of metal or noncombustible material to at least 5 ft (1524 mm) from the finished floor, in accordance with 2015, 2012, 2009 IBC Section 704.9, or 2006 IBC Section 714.4.

6.7 Installation within Plenums

The SFRMs covered in this report have been found to be suitable for use in plenums based on:

- The listing and labeling requirements of 2015, 2012, 2009, and 2006 IMC Section 602.2.1 for flame spread and smoke developed, and
- The Air-stream Resistance and Mold Growth and Humidity Resistance requirements of ASTM E859 and ASTM G21, respectively.

The SFRMs are suitable for use in plenums with the following maximum air velocities:

SFRM	Maximum Allowed Air Velocity (fpm)
MK-6/GF, MK-6/HY, MK-6/HY ES, MK-10/HB, MK-10/HB ES, MK-1000/HB, MK-1000/HB ES, Retro-Guard RG, Z-106/HY	1,370 (based on max. tested speed of 2,740 fpm)
MK-6s, Z-106/G	1,320 (based on max. tested speed of 2,640 fpm)
Z-146, Z-146T, Z-156, Z-156T	4,500 (based on max. tested speed of 9,000 fpm)

7. CONDITIONS OF USE

7.1 General:

The SFRMs described in this report comply with, or are suitable alternatives to what is specified in, those codes listed in Section 2 of this report, subject to the following conditions:

7.2 The products must be manufactured, identified, and installed in accordance with this report, the manufacturer's published installation instructions, and the applicable code. If there is a conflict between the manufacturer's installation instructions and this report, the report governs.

7.3 All assemblies shall be built in accordance with the applicable published UL designs, or as otherwise described in this report.

7.4 The density, thickness, and bond strength of the Monokote® SFRMs in this report must be measured in accordance with 2015 IBC Section 1705.14, 2012 Section 1705.13, 2009 IBC Section 1704.12, or 2006 IBC Section 1704.10.

7.5 The Monokote® MK-10/HB and MK-10/HB Extended Set (MK-10/HB ES) SFRMs recognized in this report have been evaluated for use in high-rise buildings up to 420 feet (128 m) in height in accordance with 2015, 2012, 2009 IBC Section 403.2.4 and Table 403.2.4.

7.6 The Monokote® Retro-Guard® RG, MK-1000/HB, MK-1000/HB Extended Set (MK-1000/HB ES), Z-106/HY, Z-106/G, Z-146, Z-146T, Z-156, and Z-156T SFRMs recognized in this report have

been evaluated for use in high-rise buildings up to and greater than 420 feet (128 m) in height in accordance with IBC Section 403.2.4 and Table 403.2.4.

7.7 See UL's Online Certification Directory under UL File R4339 for Spray-applied Fire-Resistive Materials (CHPX) evaluated as a part of fire-resistance-rated assemblies in accordance with ANSI/UL 263.

7.8 The SFRMs covered in this Evaluation Report are manufactured by GCP Applied Technologies, located at the manufacturing location(s) named below, under the UL LLC Listing/Classification and Follow-Up Service Program, which includes inspections in accordance with the quality elements of ICC-ES Acceptance Criteria for Quality Documentation, AC 10.

Location	Plant ID (if applicable)
Irondale, AL	IR
Santa Ana, CA	SA
Ajax, Canada	A or AJ

8. SUPPORTING EVIDENCE

8.1 Manufacturer's product literature and installation instructions.

8.2 Data in accordance with ICC-ES Acceptance Criteria for Quality Documentation (AC10), dated June 2014.

8.3 Data in accordance with ICC-ES Acceptance Criteria for Sprayed Fire-Resistant Materials (SFRMs), Intumescent Fire-Resistant Coatings and Mastic Fire-Resistant Coatings Used to Protect Structural Steel Members (AC23), dated December 2012.

8.4 UL Classification reports in accordance with ANSI/UL 263 (ASTM E119). See UL Product Certification Category, Spray-applied Fire-Resistive Materials (CHPX).

8.5 UL Classification reports in accordance with ANSI/UL 723 (ASTM E84). See UL Product Certification Category, Cementitious Cement and Plaster Mixtures (BLPR).

9. IDENTIFICATION

The products described in this evaluation report are identified by a marking bearing the report holder's name [GCP Applied Technologies], the plant identification, the UL Listing/Classification Mark, and the evaluation report number UL ER4339-02. The validity of the evaluation report is contingent upon this identification appearing on the product or UL Listing/Classification Mark certificate.

10. USE OF UL EVALUATION REPORT

10.1 The approval of building products, materials or systems is under the responsibility of the applicable authorities having jurisdiction.

10.2 UL Evaluation Reports shall not be used in any manner that implies an endorsement of the product, material or system by UL.

10.3 The current status of this report, as well as a complete directory of UL Evaluation Reports may be found at UL.com via our On-Line Certifications Directory:

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