ICC-ES Evaluation Report

ESR-5433

Issued *May 2024*

Subject to renewal May 2025

This report also contains:

- LABC Supplement

- CBC Supplement

ICC-ES Evaluation Reports are not to be construed as representing aesthetics or any other attributes not specifically addressed, nor are they to be construed as an endorsement of the subject of the report or a recommendation for its use. There is no warranty by ICC Evaluation Service, LLC, express or implied, as to any finding or other matter in this report, or as to any product covered by the report.

DIVISION: 07 00 00—THERMAL AND MOISTURE PROTECTION **Section: 07 21 00—Thermal Insulation**	**REPORT HOLDER:** **BASF CORPORATION**	**EVALUATION SUBJECT:** **BASF NEOPOR® EXPANDABLE POLYSTYRENE BEADS: KF2200, KF2300, KF2300S AND KF2400**	

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2021, 2018, 2015, 2012, and 2009 *International Building Code®* (IBC)
- 2021, 2018, 2015, 2012, and 2009 *International Residential Code®* (IRC)
- 2021, 2018, 2015, 2012 and 2009 *International Energy Conservation Code®* (IECC)
- 2013 *Abu Dhabi International Building Code* (ADIBC)†

†The ADIBC is based on the 2009 IBC. 2009 IBC code sections referenced in this report are the same sections in the ADIBC.

Properties evaluated:

- Physical properties
- Surface-burning characteristics
- Thermal resistance

For evaluation for compliance with codes adopted by Los Angeles Department of Building and Safety (LADBS), see ESR-5433 LABC and LARC Supplement.

For evaluation of compliance with codes adopted by the California Office of Statewide Health Planning and Development (OSHPD) AKA: California Department of Health Care Access and Information (HCAI), see the ESR-5433 CBC, CRC and CEC Supplement.

2.0 USES

The BASF expandable polystyrene beads designated as NEOPOR® KF2200, NEOPOR® KF2300, NEOPOR® KF2300S and NEOPOR® KF2400 are used by independent manufacturers to produce expanded polystyrene (EPS) insulation products.

3.0 DESCRIPTION

The BASF NEOPOR® KF2200, NEOPOR® KF2300, NEOPOR® KF2300S and NEOPOR® KF2400 beads have the same formulation of polystyrene, with the only difference being the diameter of the beads. The EPS insulation products manufactured with the expandable polystyrene beads are produced solely through the introduction of heat, without other additives. This process expands the beads, which are then molded into insulation products with minimum densities and maximum thickness as specified in Table 1. The end use of the polystyrene beads, including the manufacture of products, is outside the scope of this report and must be addressed in a separate evaluation report.

Boards manufactured from BASF NEOPOR® KF2200, NEOPOR® KF2300, NEOPOR® KF2300S and NEOPOR® KF2400 beads, at thicknesses and densities specified in Table 1, have a flame-spread index of 25 or less and a smoke-developed index of 450 or less when tested in accordance with ASTM E84 (UL 723). The boards have been evaluated for use in thicknesses of up to 12 inches (304.8 mm) in walls and ceilings when the EPS is separated from the interior of the building by minimum $^{5}/_{8}$-inch-thick (19.1 mm), Type X gypsum board complying with ASTM C1396, attached in accordance with the applicable code.

BASF NEOPOR® KF2200 and NEOPOR® KF2400 expandable polystyrene beads have been qualified in accordance with Section 4.5.15.1.1 of the ICC-ES Acceptance Criteria for Foam Plastic Insulation (AC12). The expandable beads can be used to produce EPS products that comply with Types II, VIII and IX [1.35, 1.15 and 1.80 pcf (22, 18 and 29 kg/m^3) minimum densities, respectively of ASTM C578, provided the final product is listed in a current ICC-ES evaluation report and has been qualified in accordance with Section 4.5.15.1.2 of AC12.

BASF NEOPOR® KF2300 and NEOPOR® KF2300S expandable polystyrene beads have been qualified in accordance with Section 4.5.15.1.1 of the ICC-ES Acceptance Criteria for Foam Plastic Insulation (AC12). The expandable beads can be used to produce EPS products that comply with Types I, II, VIII and IX [0.90, 1.35, 1.15 and 1.80 pcf (15, 22, 18 and 29 kg/m^3) minimum densities, respectively] of ASTM C578, provided the final product is listed in a current ICC-ES evaluation report and has been qualified in accordance with Section 4.5.15.1.2 of AC12.

The R-values noted in Table 3 are applicable to EPS products produced from BASF NEOPOR® KF2200, NEOPOR® KF2300, NEOPOR® KF2300S and NEOPOR® KF2400 beads when the EPS products are listed with the noted R-values in a current ICC-ES evaluation report.

The products must comply with ICC-ES qualification and labeling requirements and must be manufactured under a quality control system meeting both BASF specifications and ICC-ES requirements.

4.0 INSTALLATION

4.1 General:

Installation must be as noted in the corresponding current ICC-ES evaluation report on the EPS insulation product, or as otherwise permitted by the code official under Section 2603 of the IBC or Section R316 of the IRC, as applicable.

4.2 Attics and Crawl Spaces:

EPS insulation products produced from the EPS beads of the resin type, density, and thickness shown in Table 2 of this report can be used on walls in attics and foundation walls in crawl spaces without a code-prescribed ignition barrier applied to the attic or crawl space side of the foam plastic, provided all of the following conditions are met:

a. Entry to the attic or crawl space is only to service utilities, and no storage is permitted.

b. There are no interconnected attic or crawl space areas.

c. Attic ventilation is provided when required by 2021 and 2018 IBC Section 1202.2 (2015, 2012 and 2009 IBC Section 1203.2) or IRC Section R806, as applicable, except for unvented attic assemblies as permitted under the conditions prescribed in 2021, 2018 and 2015 IBC Section 1202.3 or 2021, 2018, 2015 and 2012 IRC Section R806.5 (2009 IRC Section R806.4) when included in the scope of the independent manufacturer's insulation board evaluation report.

d. Under-floor (crawl space) ventilation is provided when required by 2021 and 2018 IBC Section 1202.4 [2015 IBC Section 1203.4 (2012 and 2009 IBC Section 1203.3)] or IRC Section R408.1, as applicable, except for unvented crawl spaces as permitted under the conditions prescribed in 2021, 2018, 2015 and 2012 IRC R408.3 when included in the scope of the independent manufacturer's insulation board evaluation report.

e. Combustion air is provided in accordance with Section 701 of the *International Mechanical Code*®.

f. The EPS type and maximum thickness are as specified in Table 2.

5.0 CONDITIONS OF USE:

The BASF NEOPOR® Expandable Polystyrene Beads described in this report comply with, or are suitable alternatives to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

5.1 The minimum density and maximum thickness of the foam plastic insulation products manufactured from the expanded beads are as noted in Table 1 of this report.

5.2 Products manufactured from the beads must be listed in a current ICC-ES evaluation report.

5.3 Except as noted in Section 4.2 of this report, the EPS insulation products produced from the EPS beads must be separated from the building interior by a thermal barrier complying with IBC Section 2603.4 or IRC Section R316.4 or as applicable.

5.4 The beads are produced under a quality control program with inspections by ICC-ES.

6.0 EVIDENCE SUBMITTED

6.1 Data in accordance with the ICC-ES Acceptance Criteria for Foam Plastic Insulation (AC12), dated June 2015 (editorially revised December 2020).

6.2 Data in accordance with NFPA 286.

6.3 Data in accordance with ASTM E2178.

7.0 IDENTIFICATION

7.1 The ICC-ES mark of conformity, electronic labeling, or the evaluation report number (ICC-ES ESR-5433) along with the name, registered trademark, or registered logo of the report holder (BASF Corporation) must be included in the product label.

7.2 In addition, each container of beads bears a label with the manufacturer's name (BASF SE or BASF Company Ltd.) and address and the bead identification.

7.3 The report holder's contact information is the following:

BASF CORPORATION
11750 KATY FREEWAY
HOUSTON, TEXAS 77079
(908) 420-7211
www.neopor-insulation.com

TABLE 1—MINIMUM INSULATION BOARD DENSITY AND MAXIMUM THICKNESS[1]

NEOPOR® GRADE DESIGNATION	ASTM C578 EPS TYPE	MINIMUM DENSITY (pcf)	MAXIMUM THICKNESS (INCHES)
KF2300, KF2300S	I	0.90	6
KF2200, KF2300, KF2300S, KF2400	VIII	1.15	6
KF2200, KF2300, KF2300S, KF2400	II	1.35	6
KF2200, KF2300, KF2300S, KF2400	IX	1.80	6

For **SI:** 1 inch = 25.4 mm, 1 pcf = 16.02 kg/m^3.

[1]Except as noted in Section 3.0.

TABLE 2—TYPE AND MAXIMUM THICKNESS FOR EPS PRODUCTS USED IN ATTICS OR CRAWL SPACES[1,2]

NEOPOR® GRADE DESIGNATION	ASTM C578 EPS TYPE	MAXIMUM THICKNESS (INCHES)
KF2300, KF2300S	I	4.0
KF2200, KF2300, KF2300S, KF2400	VIII	3.2
KF2200, KF2300, KF2300S, KF2400	II	2.66
KF2200, KF2300, KF2300S, KF2400	IX	2

For **SI:** 1 inch = 25.4 mm, 1 pcf = 16.02 kg/m^3

[1]The expandable beads can be used to produce EPS products that are air-impermeable in accordance with 2021, 2018 and 2015 IBC Section 1202.3 or 2021, 2018, 2015 and 2012 IRC Section R806.5 (2009 IRC Section R806.4). The final product must be laminated on both sides and must be the subject of a current ICC-ES evaluation report that includes evaluation in accordance ASTM E2178 or ASTM E283 as specified in Section 4.5.11.6 of AC12.

[2]The expandable beads can be used to produce EPS products that are used in walls in attics and foundation walls in crawl spaces without a code-prescribed ignition barrier under the conditions described in Section 4.2 of this report. The boards must be the subject of a current ICC-ES evaluation report that includes evaluation in accordance with Appendix A Sections A1.2.1 and/or A2.2.1 of AC12.

TABLE 3—MINIMUM DENSITY AND *R*-VALUE

ASTM C578 EPS TYPE	*R*-VALUE (°F-ft^2-h/Btu) 75°F MEAN TEMP.[1]	*R*-VALUE (°F-ft^2-h/Btu) 40°F MEAN TEMP.[1]
I	4.5	4.7
VIII	4.5	4.8
II	4.5	4.9
II – High Density	4.6	4.9
IX	4.6	4.9
XIV	4.5	—
XV	4.4	—

For **SI:** 1 inch = 25.4 mm, 1 pcf = 16.02 kg/m^3, 1 °F-ft^2-h/Btu = 0.176 m^2-K/W.

[1] Based on a tested thickness of 1.0 inch.

DIVISION: 07 00 00—THERMAL AND MOISTURE PROTECTION
Section: 07 21 00—Thermal Insulation

REPORT HOLDER:

BASF CORPORATION

EVALUATION SUBJECT:

BASF NEOPOR® EXPANDABLE POLYSTYRENE BEADS KF2200, KF2300, KF2300S AND

1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that BASF Neopor® Expandable Polystyrene Beads NEOPOR® KF2200, NEOPOR® KF2300, NEOPOR® KF2300S and NEOPOR® KF2400, described in ICC-ES evaluation report ESR-5433, for use by independent manufacturers to produce expanded polystyrene (EPS) rigid foam insulation boards, have also been evaluated for compliance with the codes noted below as adopted by the Los Angeles Department of Building and Safety (LADBS).

Applicable code editions:

- 2023 *City of Los Angeles Building Code* (LABC)
- 2023 *City of Los Angeles Residential Code* (LARC)

2.0 CONCLUSIONS

The BASF Neopor® Expandable Polystyrene Beads NEOPOR® KF2200, NEOPOR® KF2300, NEOPOR® KF2300S and NEOPOR® KF2400, described in Sections 2.0 through 7.0 of the evaluation report ESR-5433, and the ICC-ES certified expanded polystyrene (EPS) rigid foam insulation boards produced from these beads, comply with the LABC Section 2603 and LARC Section R316, and are subject to the conditions of use described in this supplement.

3.0 CONDITIONS OF USE

The BASF Neopor® Expandable Polystyrene Beads NEOPOR® KF2200, NEOPOR® KF2300, NEOPOR® KF2300S and NEOPOR® KF2400, described in this evaluation report supplement must comply with the following condition:

- All applicable sections in the evaluation report ESR-5433.

The ICC-ES certified expanded polystyrene (EPS) rigid foam insulation boards produced by independent manufacturers from BASF Neopor® Expandable Polystyrene Beads NEOPOR® KF2200, NEOPOR® KF2300, NEOPOR® KF2300S and NEOPOR® KF2400, must comply with all of the following conditions:

- All applicable sections in the ICC-ES evaluation report for the expanded polystyrene (EPS) rigid foam insulation boards.
- The installation, conditions of use and identification are in accordance with the 2021 *International Building Code®* (IBC) and 2021 *International Residential Code®* (IRC) provisions noted in the ICC-ES evaluation report for the expanded polystyrene (EPS) rigid foam insulation boards.

This supplement expires concurrently with the evaluation report, issued May 2024.

DIVISION: 07 00 00—THERMAL AND MOISTURE PROTECTION
Section: 07 21 00—Thermal Insulation

REPORT HOLDER:

BASF CORPORATION

EVALUATION SUBJECT:

BASF NEOPOR® EXPANDABLE POLYSTYRENE BEADS, KF2200, KF2300, KF2300S AND KF2400

1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that BASF Neopor® Expandable Polystyrene Beads Neopor® KF2200, Neopor® KF2300, Neopor® KF2300S and Neopor® KF2400, described in ICC-ES evaluation report ESR-5433, have also been evaluated for compliance with the code*s* noted below, provided the insulation products are described in an ICC-ES evaluation report with a CBC, CRC and CEC Supplement.

Applicable code edition*(s)*:

- 2022 *California Building Code* (CBC)

For evaluation of applicable Chapters adopted by the California Office of Statewide Health Planning and Development (OSHPD) AKA: California Department of Health Care Access and Information (HCAI) and the Division of State Architect (DSA), see Sections 2.1.1 and 2.1.2 below.

- 2022 *California Residential Code* (CRC)
- 2022 *California Energy Code* (CEC)

2.0 CONCLUSIONS

2.1 CBC:

The BASF Neopor® Expandable Polystyrene Beads Neopor® KF2200, Neopor® KF2300, Neopor® KF2300S and Neopor® KF2400, described in Sections 2.0 through 7.0 of the evaluation report ESR-5433, comply with the 2022 *California Building Code* (CBC), and the insulation boards produced from these beads also comply with the 2022 CBC, provided the insulation boards are described in an ICC-ES evaluation report with a CBC Supplement and are installed in accordance with the 2021 *International Building Code*® (IBC) provisions, as applicable, of the evaluation report and the additional requirements of the 2022 CBC

2.1.1 OSHPD:

The BASF Neopor® Expandable Polystyrene Beads Neopor® KF2200, Neopor® KF2300, Neopor® KF2300S and Neopor® KF2400, described in Sections 2.0 through 7.0 of the evaluation report ESR-5433, and the ICC-ES certified expanded polystyrene (EPS) rigid foam insulation boards produced from these beads described in an ICC-ES evaluation report with a CBC Supplement, comply with CBC Section 803.4 [OSHPD 1,1R, 2, 4 and 5] and CBC Chapter 26 with amendments [OSHPD 1, 1R, 2, 3, 4 and 5], and the insulation boards produced from these beads also comply with these 2022 CBC OSHPD requirements, provided the insulation boards are described in an ICC-ES evaluation report with a CBC Supplement that includes OSHPD requirements within the scope.

2.1.2 DSA:

The BASF Neopor® Expandable Polystyrene Beads Neopor® KF2200, Neopor® KF2300, Neopor® KF2300S and Neopor® KF2400, described in Sections 2.0 through 7.0 of the evaluation report ESR-5433, comply with CBC Section 803.4 [DSA-SS and DSA-SS/CC] and CBC Chapter 26 with amendments [DSA-SS and DSA-SS/CC], and the insulation boards produced from these beads also comply with these 2022 CBC DSA requirements, provided the insulation boards are described in an ICC-ES evaluation report with a CBC Supplement that includes DSA requirements within the scope.

2.2 CRC:

The BASF Neopor® Expandable Polystyrene Beads Neopor® KF2200, Neopor® KF2300, Neopor® KF2300S and Neopor® KF2400, described in Sections 2.0 through 7.0 of the evaluation report ESR-5433, comply with 2022 *California Residential Code* (CRC), and the insulation boards produced from these beads also comply with the 2022 CRC, provided the insulation boards are described in an ICC-ES evaluation report with a CRC Supplement and are installed in accordance with the 2021 *International Residential Code* (IRC) provisions, as applicable, of the evaluation report and the additional requirements of the 2022 CRC.

2.3 CEC:

The BASF Neopor® Expandable Polystyrene Beads Neopor® KF2200, Neopor® KF2300, Neopor® KF2300S and Neopor® KF2400, described in Sections 2.0 through 7.0 of the evaluation report ESR-5433, comply with 2022 *California Energy Code* (CEC), and the insulation boards produced from these beads also comply with the 2022 CEC, provided the insulation boards are described in an ICC-ES evaluation report with a CEC Supplement and are installed in accordance with the 2022 *International Building Code*® (IBC) or 2022 *International Residential Code* (IRC) provisions, as applicable, of the evaluation report and the additional requirements of the 2022 CEC, under the following condition:

- In accordance with Section 110.8 of the 2022 *California Energy Code* (CEC), verification of certification by the Department of Consumer Affairs, Bureau of Home Furnishings and Thermal Insulation, must be provided to the code official, demonstrating that the expanded polystyrene (EPS) rigid foam insulation boards conductive thermal performance is approved pursuant to the California Code of Regulations, Title 24, Part 12, Chapters 12-13, Article 3, “Standards for Insulating Material.”

This supplement expires concurrently with the evaluation report, issued May 2024.