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An American National Standard

Standard Guide for Design, Fabrication, and Erection of Fiberglass Reinforced Plastic Chimney Liners with Coal-Fired Units[1]

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INTRODUCTION

Federal and state environmental regulations have imposed strict requirements to clean the gases leaving a chimney. These regulations have resulted in taller chimneys (600–1000 ft (183–305 m)) and lower gas temperatures (120–200°F (49–93°C)) due to the use of scrubbers. These regulations led to the development of fiber reinforced plastics (FRP) chimney liners in the 1970's.

Fiberglass-reinforced plastic liners have proven their capability to resist corrosion and carry loads over long periods of time. Successful service has been demonstrated in the utility and general-process industries for over 40 years. Appendix X4 is a partial listing of FRP-liner heights and diameters currently in the generating industry. The taller FRP structures and larger diameters (10–30 ft (3–9 m)) imposed new design, fabrication, and erection challenges.

A utility-industry survey of FRP liners was conducted in 1983 **(4)**.[2] This survey summarized the 19 FRP liners constructed in the power-utility industry; including Owner/A-E/Contractor, overall configuration, fuel type, and specific operating experience.

The design, fabrication, and erection of FRP liners involves disciplines which must address the specific characteristics of the material. Areas that have been shown to be of importance include the following:

(*1*) Flue-gas characteristics such as chemical composition, water and acid dew points, operating and excursion temperature, velocity, etc.

(*2*) Plant operation as it relates to variations in the flue-gas characteristics.

(*3*) Material selection and laminate design.

(*4*) Quality control throughout the design, fabrication, and erection process to ensure the integrity of the corrosion barrier and the structural laminate.

(*5*) Secondary bounding of attachments, appurtenances, and joints.

(*6*) Installation and handling.

Chimney components include an outer shell, an inner liner, breeching ductwork, and miscellaneous platforms, elevators, ladders, and miscellaneous components. The shell provides structural integrity to environmental forces such as wind, earthquake, ambient temperatures, and supports the liner or liners. The liner or liners inside the shell protects the shell from the thermal, chemical, and abrasive environment of the hot boiler gases (120–560°F (49–293°C)). These liners have been made of FRP, acid-resistant brick, carbon steel, stainless steel, high-alloy steel, shotcrete-coated steel, and shotcrete-coated shells. The selection of the material type depends on the chemical composition and temperature of the flue gas, liner height, diameter, and seismic zone. Also, variations in flue-gas characteristics and durations of transients affect material selection and design.

1. Scope

1.1 This guide offers direction and guidance to the user concerning available techniques and methods for design, material selection, fabrication, erection, quality assurance, and control.

[1] This guide is under the jurisdiction of ASTM Committee D20 on Plastics and is the direct responsibility of Subcommittee D20.23 on Reinforced Plastic Piping Systems and Chemical Equipment.

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[2] The boldface numbers in parenthesis refer to the list of references at he end of this guide.

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