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Evaluation of the Carburization of Alloy Tubes Used for Ethylene Manufacture

ABSTRACT

This NACE standard establishes a standard test procedure for pack bed carburization of alloys used for ethylene manufacture. The pack bed carburization procedure is specified in this standard because it is simple to perform. The test specimen geometry chosen reflects the intent of the procedure to be used for evaluation of carburization of furnace tube alloys intended for ethylene manufacture.

This standard also establishes two recommended methods—combustion analysis and chemical etching—for measuring the relative carburization of alloys for tubes intended for service in ethylene manufacture, or for assessing the performance of these tubes after service. Application procedures for the two methods are defined in detail.

KEYWORDS

pack bed carburization, ethylene, furnace tubes, combustion analysis, chemical etching, TG 124

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Foreword

In NACE standards, the terms "shall," "must," "should," and "may" are used in accordance with the definitions of these terms in the NACE Publications Style Manual. The terms "shall" and "must" are used to state a requirement, and are considered mandatory. The term "should" is used to state something good and is recommended, but is not considered mandatory. The term "may" is used to state something considered optional.

This NACE standard establishes a standard test procedure for pack bed carburization of alloys used for ethylene manufacture. The pack bed carburization procedure is specified in this standard because it is simple to perform. The test specimen geometry chosen reflects the intent of the procedure to be used for evaluation of carburization of furnace tube alloys intended for ethylene manufacture.

This standard also establishes two recommended methods—combustion analysis and chemical etching—for measuring the relative carburization of alloys for tubes intended for service in ethylene manufacture, or for assessing the performance of these tubes after service. Application procedures for the two methods are defined in detail. The combustion analysis method is preferred because it is quantitative. The chemical etching method is simpler and less expensive, but is only semiquantitative. Other methods considered and the reasons they are not recommended are discussed in Appendix A (nonmandatory).

The carburization measurement methods in this standard may be used independently from the pack bed carburization procedure when assessing the condition of tubes after service or when other carburization procedures have been performed.

This standard is intended to assist designers, operators, producers, fabricators, users, and testing laboratories in the selection of furnace tube alloys used for ethylene manufacture.

This standard was originally prepared in 1998 by Task Group (TG) T-5B-11, a component of Unit Committee T-5B on High-Temperature Materials Performance. It was reaffirmed in 2002 by Specific Technology Group (STG) 37, "Process Industry—High Temperature." It was revised in 2006 by TG 124, "Furnace Tubes: Evaluating Carburization Resistance of Ethylene Cracking," which is administered by STG 37. It was revised in 2014 by TG 124 and reaffirmed in 2018 by STG 37. This standard is issued by NACE International under the auspices of STG 37.

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Figures