# Discussion on standardization of microbial corrosion test method in oil and gas fields based on ISO/CD 21055

Juntao Yuan[1], Qian Li[2], Anqing Fu[1], Ting Xu[1]

*1. State Key Laboratory of Oil and Gas Equipment, CNPC Tubular Goods Research Institute, Xi'an 710077, China*

*2. China Metallurgical Information and Standardization Institute, Beijing 100730, China*

Microbiologically influenced corrosion (MIC) has become one of the main causes of corrosion failure of pipes and equipment in scenarios including water injection, hydraulic fracturing, oil and gas gathering and transportation and wastewater treatment systems in oil and gas industry. Compared with the common electrochemical corrosion caused by $CO_2$, $H_2S$, $O_2$, etc., microbiologically influenced corrosion has its uniqueness, which involves the interaction of microorganisms' own life activities or metabolites with metals. Conventional corrosion test methods are no longer applicable.

At present, there is no standard for MIC test method in the world. In 2020, scholars from the United States, Singapore, Kazakhstan, Japan, Australia and Germany jointly reviewed the progress of MIC in recent 25 years, and pointed out the main problems of MIC in laboratory research methods. First, since there are no standards and recommended practices for conducting laboratory tests, each laboratory tends to use its own electrolyte formula, so the test results cannot be compared. Second, the test results cannot be verified because there is no standard to report the details of the test procedure. For example, laboratory experiments are routinely conducted in poorly described culture media that could never be replicated without additional information, particularly regarding the concentrations of growth factors.

In May 2023, ISO 21055 became the first project to standardize microbiological corrosion test method focusing on oil and gas transmission pipeline scenarios and attracted the participation of experts from Germany, Italy, the United Kingdom, Japan, China, the Czech Republic and other countries. This project was aimed to specify a test method for MIC of oil and gas transmission pipelines, including the principle, apparatus, sources of strains, solutions, specimens, sterilization, procedure, results and report. It is applicable to MIC test of metals and alloys for internal surfaces of oil and gas transmission pipelines. In addition, the MIC test for metals and alloys used in downhole, water injection and similar systems in the oil and gas industry can also refer to this document.

ISO 21055 is currently undergoing a CD consultation to collect comments from experts in different countries. This paper presents the CD draft of ISO 21055 and discusses the issues identified during the standardization of MIC test method.