

Gauging and Inspection of Casing, Tubing, and Line Pipe Threads

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FOREWORD

This recommended practice is under the jurisdiction of the API Subcommittee on Standardization of Tubular Goods.

No provision of this recommended practice shall be cause for rejection of casing or tubing provided the threads are in accordance with the requirements of the latest edition of API Standard 5B.

This recommended practice is presented as a guide and instructional tool for pipe mill inspectors, third party inspectors, and users interested in developing skills in inspection of threads on oil country tubular goods and line pipe. It includes pictures of numerous gauges and measuring instruments. Every effort has been made to present gauges without regard to the origin of manufacture. Additionally, inclusion of certain gauges should not be construed as an endorsement of the instrument or its manufacture. Similarly, the exclusion of any gauge is not an indication of dissatisfaction with that instrument.

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Gauging and Inspection of Casing, Tubing, and Line Pipe Threads

1 Introduction

The ability of line pipe and oil country tubular goods (such as, oil and gas well casing and tubing) to perform properly depends on the physical integrity of the pipe body and connections. Threads at each end of the pipe provide a means of joining the pipe segments into a continuous “string” of pipe. There are many thread configurations applied to oil country tubular goods. However, they all have two functions in common: they must resist leakage and tensile failures. This is accomplished by applying threads which are specially designed and accurately machined. Laboratory and prototype testing prior to marketing of the connection verifies the proper design. Accurate machining depends on a repetitive process to simulate tool wear. Excessive tool wear and/or damage after machining reduces the thread’s performance.

This recommended practice provides guidance and instruction on the correct use of thread inspection techniques and equipment to assure dimensionally accurate connections. The inspector carries a heavy responsibility. This responsibility can be discharged properly only if the inspector is adequately trained. This recommended practice provides the training and insight necessary to perform an adequate inspection of line pipe and oil country tubular goods connections.

1.1 BACKGROUND

Casing and *tubing* are two terms which are used to describe oil country tubular goods that become part of a completed oil and gas well.

When these terms are used in field drilling and production operations, the term “casing” applies to pipe that is used to line the drilled hole to protect the well from formation fluid flow or formation collapse. It is a permanent part of the well in which bottom sections of casing are cemented in place. At times, cement is circulated to the surface. Among the various types of casing are conductor pipe, surface casing, intermediate or protective casing, and production casing (Figure 1). These casing strings extend to the surface. A section of the hole lined with pipe that does not reach the surface is called a liner. Liners may or may not be cemented in place.

The term “tubing” applies to the innermost pipe in a well. Well fluids are brought to the surface through the tubing. The tubing may be isolated from the casing by a production packer. Tubing is frequently removed from the hole and at times is replaced.

The terms *casing* and *tubing*, when used in a steel mill or in API specifications, are oriented to size and not necessarily to end use. The mills may not know what will be the end use of their pipe. Accordingly, in mill practice and in API specifications, casing generally covers pipe 4¹/₂-in. OD or larger. Tubing generally covers pipe 4¹/₂-in. OD and smaller. This

publication uses the terms casing and tubing in the mill/API sense. In most cases, this will also conform to the end use description.

Each of the pipe connections must be capable of withstanding internal and/or external pressure without leakage. The competence of the design and the accuracy of manufacturing of the connection provides assurance of the required leak resistance. API connections are among the most accurately machined threads currently mass produced. Each component shape and size is designed and machined to interact with the mating component to form a fluid seal.

Inspecting the threaded ends of pipe determines if the manufactured product is in compliance with the design specification. Oil country tubular goods and line pipe are inspected at the manufacturer’s facility prior to shipment. Additionally, the pipe may be inspected at the pipe yard, job site, and/or drilling rig.

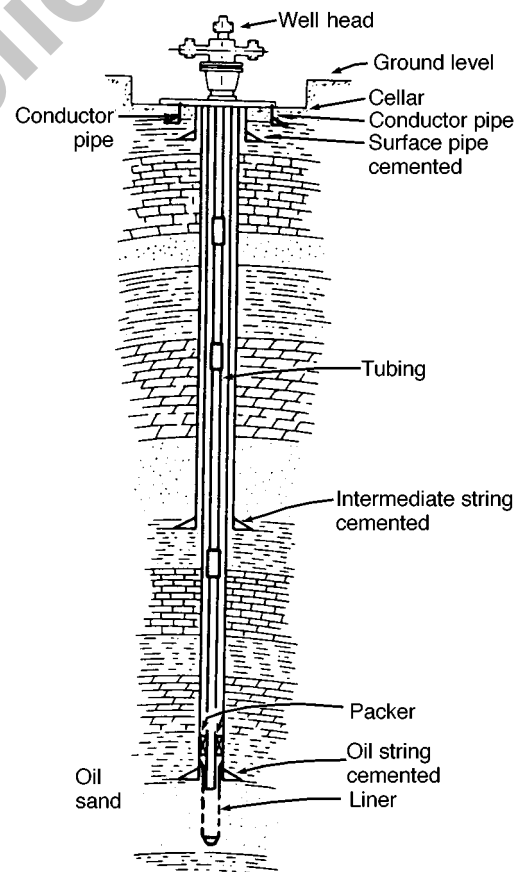


Figure 1—Schematic Diagram of an Oil or Gas Well Completed with a Hung Liner