

**【Consultation】**



Major diameters of Unified threads, such as 1/4-20 UNC, 1/2-13 UNC, are expressed in inches. In the case of 1/4-20 UNC, I understand its basic major diameter is calculated on 1/4 of 1 inch (25.4mm), it equals to 6.35mm. However, the basic major diameter of external pipe threads G1/4-19 or the old standard PF1/4-19 is 13.157 mm or 0.518 inch that doesn't equal to 1/4 inch. Can you explain the difference of the major diameter of 1/4 UNC and 1/4 PF?

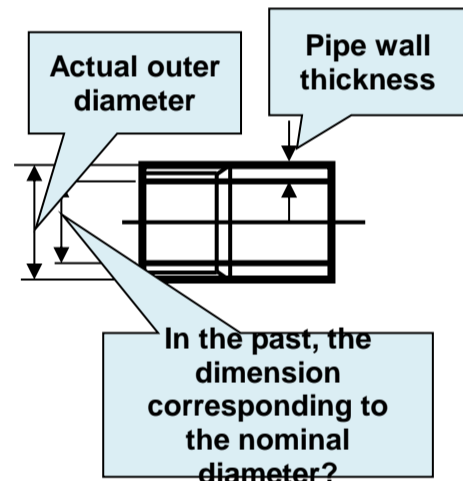
**【Answer】**

It is impossible to calculate the basic major diameter of pipe threads based on inch (25.4 mm). Perhaps there is a historical reasons to it. Unfortunately, there is no other way to determine the basic major diameter of pipe threads except to check the individual values on the standard of pipe taps.



**【Assumptions】**

1. The nominal diameters of the pipe threads represent the inner diameter of the pipe.
2. It is presumed that pipe thickness was relatively thick in the past because it was casting.
3. Even with the same nominal diameter, pipe thickness varied from each manufacturer, so it is assumed the actual major diameters of the pipe threads were different
4. It is also presumed that even when the outer diameter of the pipe is kept constant, the greater the inner diameter, the greater the flow rate, and therefore, with technological innovation pipe thickness has become thinner. (The current standard does not state that pipe inner diameter equals to nominal diameter)
5. At some point, standards were unified by the pipe manufacturers.
6. At that time, pipes that were selling the most for each size were adopted as the pipe standard which lead to a lack of



**Comparison between basic major dia and calculation**

Unit: mm

Nominal Size	Basic major dia. of pipe threads	Calculation
1/8	9.728	25.4X1/8 = 3.175
1/4	13.157	25.4X1/4 = 6.35
3/8	16.662	25.4X3/8 = 9.525
1/2	20.955	25.4X1/2 = 12.7
3/4	26.411	25.4X3/4 = 19.05
1	33.249	25.4



There are always various histories to be explained.

**【Reference: The reason why capacity of beer**

In Japan, when introducing the liquor tax law in 1940, the manufacturers had individually made "bottles", so the size and capacity varied. Because taxation per one company depended on the companies' product size, tax collection was complicated. Japan made standards of capacity for big bottles unified for better regulation of taxes. Comparing the capacity of bottles collected from each company, the maximum capacity was 643 ml and the minimum capacity was 633 ml. If the standard was set at 633ml of the smallest capacity bottle, larger capacity bottles could continue to be used and would not need to be reproduced, leading to a smoother introduction of the tax system.