

# Total Flow Area Reference



Nozzle Total Flow Area (TFA)										
# of Nozzles Nozzle Size	1	2	3	4	5	6	7	8	9	10
8	0.0490	0.0981	0.1472	0.1963	0.2454	0.2945	0.3436	0.3926	0.4417	0.4908
9	0.0621	0.1242	0.1863	0.2485	0.3106	0.3727	0.4348	0.4970	0.5591	0.6212
10	0.0766	0.1533	0.2300	0.3067	0.3854	0.4601	0.5368	0.6135	0.6902	0.7669
11	0.0928	0.1856	0.2784	0.3712	0.4640	0.5568	0.6496	0.7424	0.8352	0.9280
12	0.1104	0.2208	0.3313	0.4417	0.5522	0.6626	0.7731	0.8835	0.9940	1.1044
13	0.1296	0.2592	0.3888	0.5184	0.6481	0.7777	0.9073	1.0369	1.1665	1.2962
14	0.1503	0.3006	0.4509	0.6013	0.7516	0.9019	1.0523	1.2026	1.3529	1.5032
15	0.1725	0.3451	0.5177	0.6902	0.8628	1.0354	1.2080	1.3805	1.5531	1.7257
16	0.1963	0.3926	0.5890	0.7853	0.9817	1.1780	1.3744	1.5707	1.7671	1.9634
18	0.2485	0.4970	0.7455	0.9940	1.2425	1.4910	1.7395	1.9880	2.2365	2.4850
20	0.3067	0.6135	0.9203	1.2271	1.5339	1.8407	2.1475	2.4543	2.7611	3.0679
22	0.3712	0.7424	1.1136	1.4848	1.8561	2.2273	2.5985	2.9697	3.3410	3.7122
24	0.4417	0.8835	1.3253	1.7671	2.2089	2.6507	3.0925	3.5342	3.9760	4.4178

Total Flow Area (TFA) is summation of nozzle areas which fluid can pass through. When you consider about the TFA, you need to count all nozzles that you have in a bit or a reamer.

Basically, you can determine flow area with a simple circle area formula.

Where;

Area in square inch

$\pi$  is a constant which approximately equates to 3.14159.

D is diameter in inch

$$\text{Flow Area} = (\pi \times D^2) / 4$$

Let's make it easier for our life. Normally, a diameter of nozzle is reported in xx/32 inch. For example, a bit has 3 nozzles and each one of them has size of 20/32 inch.

The formula above can be simplified like this.

Where;

Area in square inch

N is nozzle size in number/32 inch.

$$\text{Flow Area} = (N^2) / 1303.8$$

For instant, you use a bit that has a total of 5 nozzles. Three nozzles have a diameter of 10/32 inch and other 2 nozzles are 12/32 inch diameter. Determine the total flow area (TFA) of the bit.

By the definition, you must sum every nozzle together in order to get the TFA; therefore, you can apply the formula above into this form.

$$\text{Total Flow Area} = (10^2 + 10^2 + 10^2 + 12^2 + 12^2) / 1303.8 = 0.451 \text{ inch}$$

$$\text{Total flow area} = 0.451 \text{ square inch}$$