CLAIMS

1. An orifice plate configured to be positioned in a conduit, the conduit having a diameter D_p, the orifice plate comprising a central opening and a ring-shaped region, in which the central opening has a diameter D_1 and the ring-shaped region is located at a radius R_2 from the center of the orifice plate and surrounds the central opening;

in which the central opening includes an inlet, the inlet of the central opening has a contoured edge;

in which the ring-shaped region includes two or more openings formed through the orifice plate with a center of each opening centered on the radius R_2, in which the radius R_2 satisfies a relationship, $R_2 = (D_p + (D_1 + 2(RCo)))/4$, where RCo is a radius of the contoured edge of the central opening;

in which the two or more openings each have a diameter D_2, each of the two or more openings equally satisfy a velocity distribution relationship

$$\frac{V_2}{V_1} = \left(1 - \frac{R_2}{R_p}\right)^b \text{ ; and}$$

in which the diameter D_2 of each of the two or more openings and the diameter D_1 of the central opening equally satisfy a Reynolds matching relationship

$$N_{RE,\,1} = N_{RE,\,2}$$

in which:

$$N_{RE,\,1} = \frac{D_1 \rho V_1}{\mu};$$

$$N_{RE,\,2} = \frac{D_2 \rho V_2}{\mu};$$

$N_{RE,\,1}$ is a Reynolds number for the diameter D_1 of the central opening;

$N_{RE,\,2}$ is a Reynolds number for the diameter D_2 of each of the two or more openings;

V_1 = velocity of a flow through the central opening;

V_2 = velocity of a flow through the center of each of the two or more openings;

ρ = density of a fluid;

μ = viscosity of the fluid; and

R_p = radius of the conduit.

2. An orifice plate according to Claim 1, in which the ring-shaped region includes six openings formed through the orifice plate with the center of each opening centered on the radius R_2.

3. An orifice plate according to Claim 1, in which the central opening and the two or more openings each have an inlet, each inlet having a curvature in the magnitude of 0.003 percent to 50.0 percent of a radius of the corresponding opening.

4. An orifice plate according to Claim 1, in which an inlet of each of the two or more openings has a blunt edge.

5. An orifice plate according to Claim 1, in which an inlet of each of the two or more openings has a knife edge.

6. An orifice plate according to Claim 1, in which an inlet of each of the two or more openings has a tapered or bevelled edge.

7. An orifice plate according to Claim 1, in which an inlet of each of the two or more openings has a contoured edge.

8. An orifice plate according to Claim 1, in which an outlet of each of the two or more openings has a blunt edge.

9. An orifice plate according to Claim 1, in which an outlet of each of the two or more openings has a knife edge.

10. An orifice plate according to Claim 1, in which an outlet of each of the two or more openings has a tapered or bevelled edge.

11. An orifice plate according to Claim 1, in which an outlet of each of the two or more openings has a contoured edge.

12. An orifice plate according to Claim 1, in which an inlet of each of the two or more openings has a contoured edge and in which an outlet of each of the two or more openings has a contoured edge.

13. An orifice plate according to Claim 1, in which the central opening and the two or more openings are circular.

14. An orifice plate according to Claim 1, in which the orifice plate further comprises a tap extending into an interior portion of one of the two or more openings of the ring-shaped region.

15. An orifice plate according to Claim 1, in which the orifice plate further comprises a first tap and a second tap, in which the first tap is located upstream of the orifice plate and the second tap is located downstream of the orifice plate.

16. An orifice plate according to Claim 1, in which the orifice plate further comprises a first tap, a second tap, and a third tap, in which the first tap is located upstream of the orifice plate, the second tap is located downstream of the orifice plate, and the third tap extends into an interior portion of one of the two or more openings of the ring-shaped region.