

ENGINEERING REPORT

TOPIC: Advantages of True Round Fire/Smoke Dampers

By Richard Cravy

HVAC system designers are specifying more round duct today than ever before. The reasons for more round duct are:

1. Round duct performs better than square duct.
2. Round duct can be produced more economically than square duct.
3. Round duct is stronger than comparably sized square duct.

The same can be said for dampers. Round fire/smoke dampers have better pressure drop and airflow performance than their square or rectangular counterparts. Round fire/smoke dampers are built from less material and therefore cost less to produce. Once the designer has selected round duct, the overall installed cost of round dampers versus square dampers with transitions is greatly reduced. There are fewer pieces to handle. Sleeves are integral to the damper and retaining plates make round dampers installable in either

square or round openings within fire rated walls and floors. Noise through a round damper is also significantly reduced because of the even airflow characteristics.

Round versus square advantages

1. **Installation time reduced**
2. **Fewer piece parts at job site**
3. **Lower product cost**
4. **Less noise generation**
5. **Less pressure drop**
6. **Factory shipped retaining plates**
7. **Integral sleeve**

This engineering report compares round dampers to their square counterparts using indexed product costs and typical performance criteria.

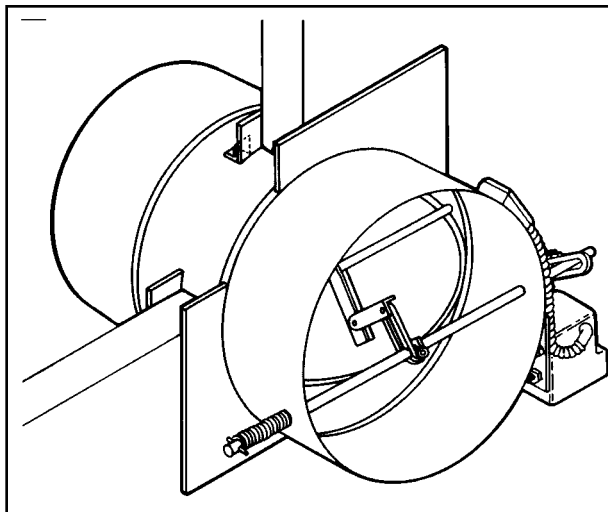


FIGURE 1

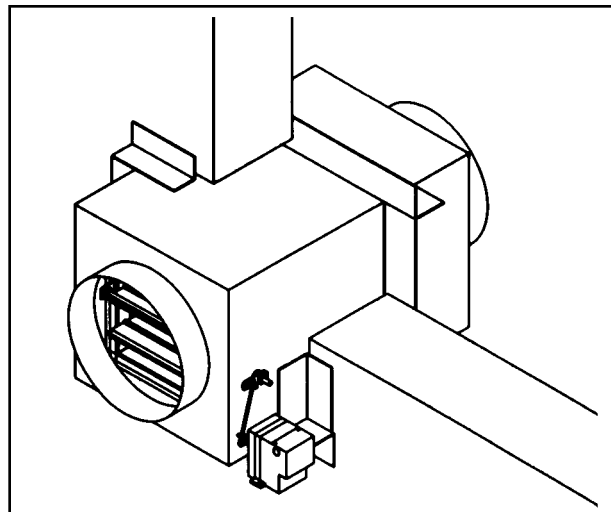


FIGURE 2

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Figure 1 depicts Ruskin's FSDR25 damper. The FSDR25 is designed and qualified specifically for point-of-origin fire containment and smoke control and meets code requirements for critical system performance. Figure 2 shows a square damper with a square-to-round transition mounted in a wall.

Comparison

Round dampers have significant performance advantages in terms of airflow and pressure drop when compared to square dampers with round transitions. Figure 3 compares the per-

formance of the FSDR25 with an airfoil blade damper (FSD60) and a triple vee groove blade damper at arbitrary CFM's. As you can see, **the FSDR25 outperforms the two rectangular FSD dampers by an average of 40%!**

In addition to the performance advantages, Figure 4 details a relative cost comparison between the FSDR25 and the FSD60 and FSD36. The FSDR25 and FSD60 are UL Class I and the FSD36 is Class II. The two examples indicate **a weighted cost difference of 23% less for the FSDR25.**

PERFORMANCE COMPARISON
EXAMPLE #1
FSD60 with 10" Round Transition @1000 CFM; DELTA P = .140*
FSD36 with 10" Round Transition @1000 CFM; DELTA P = .170*
10" FSDR25 @1000 CFM; DELTA P = .110
EXAMPLE #2
FSD60 with 18" Round Transition @4000 CFM; DELTA P = .078*
FSD36 with 18" Round Transition @4000 CFM; DELTA P = .120*
18" FSDR25 @4000 CFM; DELTA P = .045
*PRESSURE DROP INCLUDES LOSSES DUE TO RUSKIN TYPE "CR" TRANSITIONS IN SQUARE TO ROUND APPLICATIONS.

FIGURE 3

RELATIVE COST COMPARISON
EXAMPLE #1
FSD60 with 10" Round Transition, <u>Conv. Angles and 17" Sleeve</u>
Price Index (W/ACT*) = 1.00
FSD36 with 10" Round Transition, <u>Conv. Angles and 17" Sleeve</u>
Matching Price = .885
FSDR25 with 10" Retaining Plates and 17" Sleeve
Matching Price = .782
EXAMPLE #2
FSD60 with 18" Round Transition, <u>Conv. Angles and 17" Sleeve</u>
Price Index (W/ACT*) = 1.00
FSD36 with 18" Round Transition, <u>Conv. Angles and 17" Sleeve</u>
Matching Price = .882
18" FSDR25 with Retaining <u>Plates and 17" Sleeve</u>
Matching Price = .745

FIGURE 4

