

**NC Department of Insurance
Office of the State Fire Marshal - Engineering Division
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Dryer Exhaust Duct 4-inch diameter

Code: Mechanical Code

Date: 10/25/2023

Section: NCMC 504.8.1ⁱ, NCRC M1502.4.1ⁱⁱ

Question:

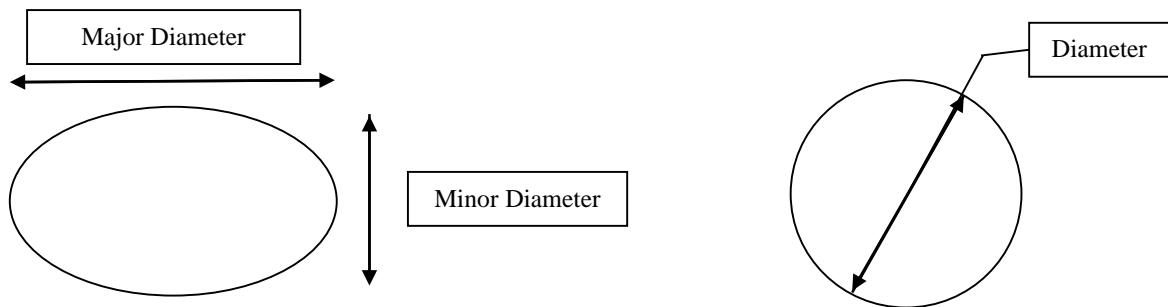
Is the 4-inch nominal diameter metal duct required in NCMC 504.8.1 allowed to be squashed, reduced, or “ovalled” to fit in a 3.5-inch stud wall?

Answer:

No.

The code requirement for a 4-inch nominal diameter duct is signifying that the duct is to be round, as a circle is the only shape that is defined by a single diameter. Oval or “ovalled” duct due to compressing a 4-inch round into a 3.5-inch stud cavity would have a minor and major diameter provided, such as shown in Figure 1.

Figure 1: Illustration of oval duct versus round duct dimensioning



Several years ago, the code-making proceedings of the model code (ICC) were viewed on-line, and the discussion centered around whether or not this code section should say “round” as there was reportedly confusion in some areas of the country if ovaling the duct or using oval duct was acceptable to get the duct into a 3.5-inch stud cavity. After much discussion, the code committee decided that the 4-inch diameter designation is sufficient to signify that the requirement is for round duct, and not an oval duct or an oval duct section. Their final statement was something to the effect of “diameter means round and only round”. This 4-inch round requirement is largely because it syncs up with the size and shape of the dryer duct for when dryers are tested and listed by the various manufacturers. Likewise, transitions that have squares or rectangles are not

allowed, as they would have other dimensions other than 4-inch diameter. Free area is not an equivalence in this section of the code, as lint catching and settling will occur in areas that provide eddies and cross-sectional volume changes.

Follow up question #1:

Does the “nominal” in the 4-inch diameter metal duct requirement in NCMC 504.8.1 allow for a ½-inch reduction, like a nominal 2x4 stud is 1.5-inches by 3.5-inches?

Answer:

No.

Nominal sizes for sheet metal are much tighter tolerances than for wood studs. Sheet metal ducts have one end as the inner dimension, i.e. 4-inch, and the other end as the outer dimension, i.e. 4-inches plus the sheet metal thickness of approximate 28-gage, so that one end will slip into the next section. A section that has a ½-inch variance would not work, and is not what this code section is referring to with “nominal”.

If the dryer duct is concealed in a wall, that stud cavity cannot be a 3.5-inch depth; it will have to be at least 4-inches, which is normally accomplished with the use of a 5.5-inch stud.

Although there are many duct fittings that can be purchased on the Internet or at hardware stores that transition from round to oval/square/rectangular/ back to round, these are not code compliant when utilized as part of a dryer exhaust system as they can become or act as settling chambers.

Keywords:

Ovalled duct

504.8 Domestic clothes dryer ducts. Exhaust ducts for domestic clothes dryers shall conform to the requirements of Sections 504.8.1 through 504.8.6.

504.8.1 Material and size. Exhaust ducts shall have a smooth interior finish and shall be constructed of metal a minimum 0.0157 inch (0.4 mm) thick (28 ga galv. 26 ga Al). With the exception of the transition duct, flexible ducts are prohibited. The exhaust duct size shall be 4-inches (102 mm) nominal in diameter.

ii **M1502.4 (504.8) Dryer exhaust ducts.** Dryer exhaust ducts shall conform to the requirements of Sections M1502.4.1 through M1502.4.7.

M1502.4.1 Material and size. Exhaust ducts shall have a smooth interior finish and be constructed of metal having a minimum thickness of 0.0157 inches (0.3950 mm) (No. 28 gage for steel, No. 26 gage for aluminum). With the exception of the transition duct, flexible ducts are prohibited. The duct shall be 4 inches (102 mm) nominal in diameter.