Sizing your Protector HD metal detector

Determining the proper height and width of your metal detector ensures that your application is getting the best possible sensitivity; both height and width play critical roles in sensitivity and ease of installation.

The Protector HD is designed to fit rails utilizing standard CEMA-approved rollers. In most instances, the detector will drop directly between the rails and no modification is required other than the drilling of mounting holes.

With that in mind, the Protector HD is built specifically to standard belt widths, and the aperture of the detector is always 6 inches greater than the belt width. This provides 3 inches of space on each side of the belt to prevent unwanted contact with the detector.

The following chart will assist you in determining your aperture width.

Belt Width	Required Aperture Width
18"	24"
20"	26"
24"	30"
30"	36"
36"	42"
42"	48"
48"	54"
54"	60"
60"	66"
72'	78"
84"	90"
95"	101"

Determining aperture height is a bit more complicated, as it depends upon variables that are outside of the physical constraints of the detector and conveyor. When determining the height of the aperture of your Protector HD, the following must be considered:

- Trough angle of the belt
- Lump size of the product
- Burden depth of the product
- Bulk Density of the product resulting in belt sag
- Sensitivity specification

Trough Angle: When a belt is troughed, it adds height to dimension of the belt. This is a constant, so the chart below will provide you with trough angle heights.

Belt Width	20° Trough Angle	35° Trough Angle	45° Trough Angle
18"	2 ½"	3"	5"
20"	2 ½"	3"	5"
24"	3"	5"	6½"
30"	4"	6½"	8"
36"	4½"	7½"	9"
42"	5"	9"	11"
48"	6"	10"	12"
54"	6½"	11"	13½"
60"	7½"	12"	14½"
72"	9"	14½"	18"
84"	10"	17"	21"
96"	11½"	19"	23½"

Lump Size: Is a User Variable, it is the physical size of the product you're running on the belt. If your product is a mix of large and small sizes, always record the largest possible size. This, when combined with trough angle height and burden depth, will determine the highest possible material height.

Burden Depth: Burden depth is also considered a User Variable – it is determined by the user – but plays an important role in determining the height of the aperture of the detector. In most instances burden depth can be determined by simply measuring the depth of the product on the belt. In the case of new applications, burden depth can be calculated using the following:

1.) Conveyor belt width in inches
2.) Conveyor belt speed in feet per minute
3.) Feed rate in tons per hour
4.) Bulk Density (specific weight) in lbs. per cubic foot (see Bulk Density chart)
5.) Feed Capacity (ft3 per hour) : Tons per hour ÷ bulk density x 2000 = ft3/hr
6.) Burden Width in feet: Belt Width - 6" ÷ 12"

Formula to calculate Burden Depth in inches:

$$\frac{\textbf{Feed Capacity (ft3/hr)}}{\textbf{(Belt Speed x Burden Width x 60)}} \times \textbf{12} \times \textbf{1.5} = \textbf{Burden Depth in inches}$$

Calculating Aperture Height: To calculate aperture height, several factors must be considered.

• Is your burden depth + lump size larger than your trough angle height?
• Is there belt sag as a result of heavy burden on the belt?
• Do I have a specific sensitivity specification?

If your **lump size + burden depth** value is **less** than your trough height, use *trough height plus 4"* to determine your aperture height.

If your **lump size + burden depth** value is **larger** than your trough height, use your *lump size + burden depth value plus 4"* to determine aperture height.

If you are expecting more than 1" of belt sag, add an additional 2" to the total height.

Aperture heights are available in the following heights: 12", 18", 24", 30", 36", and 42". Please contact the factory if your height requirements are smaller than 12" or larger than 42".

After determining your required aperture height, match your number to the closest available aperture height. The shorter the aperture height, the more sensitive the unit will be. If sensitivity is critical, please contact the factory for a review of the application and a quote for a custom aperture height.