Sugar Crystal Size: Mean Aperture (MA) and CV

Mean aperture and coefficient of variation of a sugar's crystal size from the 16, 50 and 84 % points of its cumulative sieve curve (Powers).

Method: Powers (1948) MA/CV for a normal size distribution: CV = 100 (d84 − d16)/(2 d50)

Input parameters

Unit system: SI

Parameter	Value	Unit
Size at the 16 % point of the cumulative curve	0.42000	mm
Size at 50 % cumulative (median)	0.60000	mm
Size at the 84 % point of the cumulative curve	0.78000	mm

Calculated results

Parameter	Value	Unit
Mean aperture	0.60000	mm
Coefficient of variation	30.000	%

Notes for this case

- Read the three sizes from the cumulative curve on probability paper or by interpolation. Either a passing or a retained curve may be used: CV uses the spread between the 16 % and 84 % sizes.

Formula and method

$$MA = d_{50}, \quad CV = \frac{|d_{84} - d_{16}|}{2\,d_{50}}$$

Variables

d_{16}	Size at the 16 % point of the cumulative curve	m
d_{50}	Size at 50 % cumulative (median)	m
d_{84}	Size at the 84 % point of the cumulative curve	m
MA	Mean aperture	m
CV	Coefficient of variation	-

Method and standards

Powers.

Assumptions and limits

- Near-normal distribution; a clearly skewed curve (16 % and 84 % sizes far from symmetric about the median) is flagged.
- On a retained curve the 16 % size is the coarser one, on a passing curve the finer; either order is accepted and CV uses the spread.

References

- Powers (1948) MA/CV for a normal size distribution: CV = 100 (d84 − d16)/(2 d50)

Report details

Report reference	FCC-MPW7-YKHT (the same inputs always give the same reference)
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Method last reviewed	13 November 2026
Software release	FireCAD Calc, release of 17 November 2026
Release checks	2 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/sugar-ethanol/centrifugals-sugar-house/sugar-crystal-size-ma-cv

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.