Charpy Impact Test Cheat Sheet

Method, specimen, units and typical results

Key equations

Quantity	Equation	Notes
Specimen	**55 × 10 × 10 mm with machined V-notch**	Standard Charpy bar
Absorbed energy	**E = pendulum energy before − after**	Joules (SI); ft-lb in the article's lab
Impact strength	**E / A_{notch}**	Joules divided by notch cross-section area
Percent error	**|published − measured| / published × 100**	Used against table values
Charpy vs Izod	**Horizontal (both ends) vs vertical cantilever**	Per the article, citing ASTM E23
Notch types	**V-notch, U-notch, keyhole**	Keyhole is used in steel casting

Key takeaways

- Higher energy = ductile; lower = brittle. Flat fracture face = brittle, jagged shear lips = ductile.
- Run at several temperatures to plot the ductile-to-brittle transition temperature.
- Procedure: lock the pendulum, calibrate friction (3 empty swings), notch faces away from the hammer, subtract friction.
- Introduced by Georges Charpy in 1901; also tied to WWII ship fracture studies.
- Automotive link: body-in-white must absorb crash energy while limiting intrusion.
- Reported cast iron comparison: 1 ft-lb vs 3.7 ft-lb gives 73% by the formula above, not the 68.7% the article states. Please check.

Lab results in the article (ft-lb)

Material	Measured	Compared to	Error
Cast iron	1	AZ31B Mg 3.7	68.7% (stated)
1018 steel	44	8630 steel 41	7.31%
6061 aluminum	11	2028 Al 7.6	44.7%

Reference values are typical; verify against datasheets and codes for design.