

ALLOY INSIGHTS

EN57, 431 and 1.4057

How do they compare?



Stainless steel grades EN57#, 431 and 1.4057 are comparable martensitic stainless steel grades but produced to different specifications. However EN57 is a very old designation for the grade produced in accordance with BS970. The designation changed to 431S29 and when BS970 was replaced by EN10088# this designation also became obsolete. Thus any requirement for EN57 needs to be restated in line with this.

431 / 1.4057, the most corrosion resistance of the conventionally hardenable stainless steels, also has useful mechanical properties and is used extensively for valve spindles, pump shafts and similar applications requiring strength and corrosion resistance.

#- For EN57 the "EN" refers to Emergency Number, a listing of steels used in the UK in 1941, whilst for EN10088 it is the abbreviation for Euro Norm the standards system that emerged with the formation of the European Union

Compositions

%	Source	C	Cr	Ni	Mo	Mn*	Si*	S*/P*
EN57	BS970 P1: (1983)	0.12- 0.20	15.0-18.0	2.0-3.0	-	1.0	1.0	0.03/0.04
431	ASTM A276	0.2*	15.0-17.0	1.25-2.5	-	1.0	1.0	0.03/0.04
1.4057	EN10088-3 (2014)	0.12-0.22	15.0-17.0	1.50-2.5	-	1.0	1.5	0.03/0.04

*-Maximum

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Mechanical Properties

	Condition ¹	Tensile Strength (MPa)	0.2% Proof Strength* (MPa)	Elongation* ² (%)	Impact Energy* ²	Hardness (Brinell)
EN57	Softened					277 max
	T	850-1000	635	11	25 / 15 (Izod)	248-302
431	Annealed					285 max
	Quenched					HRC40 min
1.4057	Annealed	950max				295 max
	QT800	800-950	600	14 / 12	25 / 20 (ISO)	
	QT900	900-1050	700	12 / 10	16 / 15 (ISO)	

¹-Heat treated as per specification ²-see Comments * Minimum

Comments

- The information presented is to support decision making for the substitution of EN57/431S29 by 431/1.4057 but the standards referenced should also be consulted.
- EN10088 provides more comprehensive information than BS970 and thus the grade supplied in accordance with the newer specification has become the norm and is accepted in industry.
- The dual values for elongation and Impact energy are for bars 60mm diameter and less and those greater than 60mm respectively. This is in line with the practice for heat treatable steels since the ruling section can affect these properties.
- Although the Izod and ISO impact tests measure toughness in a similar way the values are NOT interchangeable. There is a difference in specimen dimensions, notch depth and units of measure – kJ/m² for ISO and ft-lb/in for Izod.

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