Materials

BETE manufactures nozzles in hundreds of different materials and combinations of materials. The chart on the bottom of these two pages shows which nozzles are readily available in the materials most often specified. If you don't know which material is best for your application, BETE Applications Engineering can help you with your selection. Some factors which influence the nozzle material selection process are:

Temperature: Melting or softening of material establishes maximum temperature limits. However, these temperature limits must be reduced when corrosion, oxidation, or chemical attack are also present. See column in blue for general temperature limits for various materials.

Corrosion. Plastics offer superior corrosion resistance at relatively low cost, but can only be used in low-temperature applications. In general, metals can be ranked in the following order of corrosion resistance (from lowest to highest): cast iron, brass, stainless steels, nickel-based alloys, refractory metals and precious metals. Ceramics have excellent corrosion resistance except in very high pH environments.

Chemical attack. There are few general guidelines to this complex subject, but the material used for piping may provide a useful indicator of a suitable nozzle material. If the environment of your application is known to contain substances which may attack the spray nozzle, contact BETE Applications Engineering for advice.

Abrasion. Hardened Stainless Steel, Cobalt Alloy 6, tungsten carbide and ceramics are commonly used in applications where abrasive fluids are sprayed.

Cost. There are exceptions, but materials can generally be ranked in the following order in terms of cost (from lowest to highest): brass, cast iron, plastics, stainless steels, cobalt-based alloys, nickel-base alloys, ceramics, refractory metals and precious metals.

Material Description	BETE Material No. (MN)	(DIN) Description	Temp. Rating (° F)	Trade Name*	U.S. ASTM or AMS Cast Specification	U.S. ASTM Bar Specification
Brass	4	Messing	450°		B30 C85700	B16 C36000
Naval Brass	64		750°		B21 C46400	
Bronze		Bronze	750°		B30 C95400	B103 C54400
L.C. Steel	72	C-Stahl	400°			A108 Gr 12L14
Cast Iron	28	Gusseisen	450°			
218	4K		1800°	Nitronic 60		A276 S21800
303	5	1.4305	800°		A 743 CF-16F	A582 S30300
304	6	1.4301	800°		A 743 CF-8	A276 S30400
304L		1.4306	800°		A 743 CF-3	A276 S30403
Duplex 2205	2X		600°		A 890 J92205	A276 S32205
316	7	1.4401	800°		A 743 CF-8M	A276 S31600
Tungsten Carbide	7H					
Alumina	26					
Boron Carbide	7P		1500°			
316L	20	1.4404	800°		A 743 CF-3M	A276 S31603
317	21	1.4440	800°		A 743 CG-8M	A276 S31700
317L	22	1.4438	800°		A 743 CG-3M	A276 S31725
416		1.4005	800°			A582 S41600
904L	74	1.4539	800°			
Alloy 20	70	2.4660	900°	Carpenter® 20	A 743 CN-7M	B473 N08020
Nickel Alloy M30C	37	2.4360/2.4366	1000°	Monel®	A 494 M-30C	B164 N04400
Nickel Alloy 600	35	2.4816	2000°	Inconel® 600		
Nickel Alloy 625	3B	2.4856	2000°	Inconel® 625	AMS 5402	B446 N06625
Nickel Alloy 800	33	1.4876	1850°	Incoloy® 800		B408 N08800
Nickel Alloy 825		2.4858	1850°	Incoloy® 825		B425 N08825
Nickel Alloy B	31	2.4800/2.4810	1400°	Hastelloy® B w/2.5 Max. Co	A 494 N-12MV	B335 N10665
Nickel Alloy G	32	2.4619	2000°	Hastelloy® G	B 581 N06007	B581 N06007
Nickel Alloy G30	49	2.4603	2000°	Hastelloy® G30		B581 N06030
Nickel Alloy C276	81	2.4819	2000°	Hastelloy® C276	A 494 CW-2M	B574 N10276
Nickel Alloy C22	2A	2.4602	2000°	Hastelloy® C22	A 494 CX-2MW	B574 N06022
Nickel	38	Nickel	650°			B160 N02200
Titanium	11	Titan	900°			B348 Gr 2
Tantalum	40	Tantal	2700°			B708 R05200
Zirconium	61	Zirkonium	1000°			B550 R60702
Cobalt Alloy 6	9		1900°	Stellite® 6	AMS 5387	
SNBSC ceramic	62		3000°	Refrax®		
RBSC ceramic	59		2500°			
PTFE	3	PTFE	300°	Teflon®		D1710 G1, T2, CA
PVDF	36	PVDF	245°	Kynar®		D3222 Tp 1, Cl 2
PVC	1	PVC	135°			
CPVC	16	CPVC	185°			
Polypropylene	2	Polypropylen	155°			
UHMW	17		180°			
Polyurethane	69		176°			
ABS	15		155°			

*** BETE does not represent that it manufactures its products with materials sold under any of these brand names.** Customers sometimes ask for BETE products without using a USA standard specification for the material they require. When materials are described incompletely, with DIN specifications or with a commonly used brand name, BETE will usually supply materials according to the USA specifications listed above. Specifications for forms other than cast or bar may differ from the above.

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Materials by Nozzle Type

The chart below shows the most common materials used for different types of nozzles – as indicated by a solid dot (•), as well as those materials that are used less often – as indicated by an open dot (o) (all sizes may not be available in "open dot" materials.) While nozzles in many of these materials would be considered "specials" by other companies, we can typically deliver them within "standard" schedules and at very competitive prices, thanks to our in-house foundry and state-of-the-art CNC machining capabilities.

BJ	CW	EZ	FF	SS IS	L	LEM	CLUMP MP	MWH MW	N	NC NCFL NCS NCSQ	NCJ NCK	NF NFS	OC	P PJ	PSR	SA	SC SCFL	SPN	ST STXP Cap Base	Tip	TC	TD TDL Body Carrier	Wear Parts	TF TF29 TFXP TFXPW	TH THW	TW	WL	WT WTX WTZ	XA
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BJ	CW	EZ	FF	IS SS	L	LEM	MP CLUMP	MW MWH	N	NCSQ NCS NCFL NC	NCK NCJ	NFS NF	OC	PJ P	PSR	SA	SCFL SC	SPN	Cap Base STXP ST	Tip	TC	Body Carrier TDL TD	Wear Parts	TFXPW TFXP TF29 TF	THW TH	TW	WL	WTZ WTX WT	XA