

Head Sealing Types

Self-Seal® O-Ring Sealing Fasteners

- **Positive Sealing—Pressure and Vacuum**
- **Cold-Formed for Superior Strength and Uniformity**
- **High Re-Usability**
- **Optional Self-Locking Capability**

Self-Seal® fasteners, manufactured exclusively by Long-Lok, are designed to provide the optimum combination of sealing and fastening in one complete unit. They are cold formed for strength and uniformity, and then assembled with O-rings capable of sealing almost any fluid or gas.

With Self-Seal fasteners, these resilient O-rings are positioned under the head in a precision-engineered groove, and are affected little by repeated assembly and disassembly. They provide a superior degree of sealing and re-usability to the common alternative techniques of chemical coatings or plastic washers that attempt to seal the threadform. And, unlike these common alternatives, with Self-Seal fasteners you're not limited to a few compatible finishes or hampered by extra parts that need stocking, inventory and assembly.

Long-Lok offers a wide selection of materials, finishes and O-rings to configure an endless variety of Self-Seal Fasteners and custom components capable of withstanding operating temperatures from -300°F to +500°F.



Typical Applications

- Motors
- Cabinets and enclosures
- Sensors and instrumentation
- Internal combustion engines
- Gear pumps
- Fuel tanks
- Transmissions
- Gear boxes
- Air cylinders
- Pressure gauges
- Computer disk drives
- Motion control valves
- Missile tank
- Wet wings

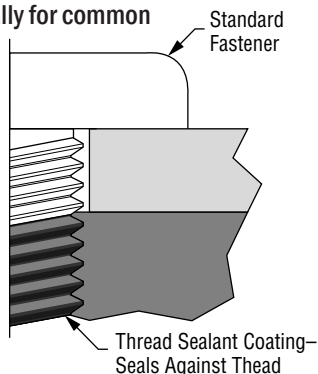
SELF SEALING FASTENERS

Self-Seal® Method and Advantages

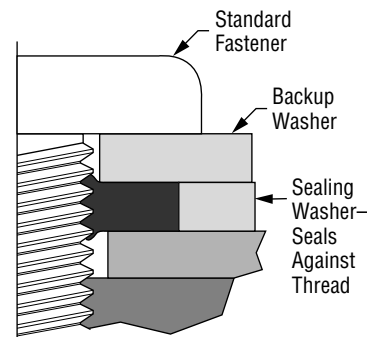
To understand why Long-Lok Self-Seal® fasteners are the most complete answer to combined fastening and sealing operations, it helps to know where the alternatives fall short. The two main alternatives are thread coatings (liquids or tapes), and external plastic washers.

Conventional Sealing Techniques

Coatings, such as Vibra-Seal®, which we also offer (following this section) are cost-effective for moderate performance applications... especially for common fluid fittings where repeated disassembly is uncommon. But, since the coating is applied directly to the thread form, sealing properties deteriorate with reuse. Also, coatings are not compatible with all finishes.



Plastic Washers also get their sealing properties through direct interaction with the threadform. Like thread coatings, they are prone to deterioration due to the cutting action of the thread it's trying to seal, thus limiting their re-usability. Additionally, sealing washers, prone to cold flow, are separate components that must be assembled onto the fastener (typically with other washers), and calculated into the assembly dynamics and measurements; a consideration to factor into your actual installed cost.

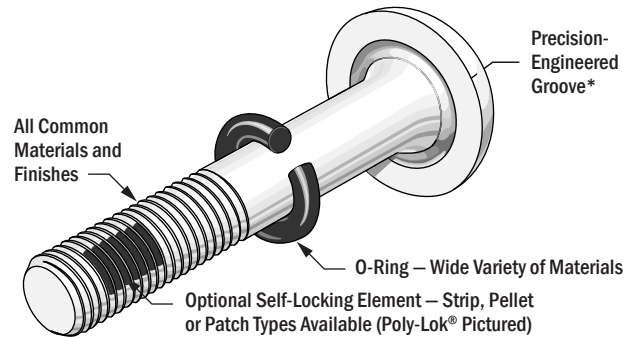


Self-Seal® Sealing Technique

Self-Seal® fasteners overcome all these limitations by placing an O-ring under the head for sealing. With this elegant solution, Self Seal fasteners offer these unique advantages:

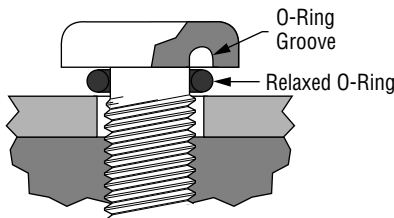
- Assemble mating components using standard torque values.
- Specify any common surface finish.
- Metal-to-metal contact.
- High re-usability.
- Positive sealing from either side of the assembly.

Self-Seal fasteners are designed and manufactured with a cold-formed groove beneath the head of the fastener. As the fastener is tightened, the O-ring is compressed, squeezing the O-ring between the groove and mating surface to complete the seal. The design of the groove controls the amount of compression to the O-ring. And because O-rings retain their elastic memory, Self-Seal fasteners are reusable time after time. The O-Ring groove is optional for 100° flathead fasteners. Standard 100° flatheads are without the O-Ring groove. See page 39 when ordering.

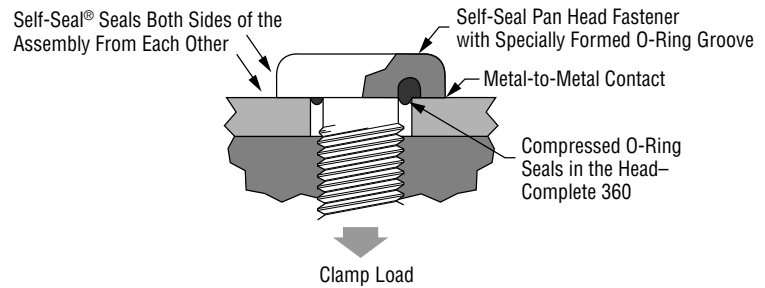


* groove optional on 100° flathead fasteners.

Before Installation



Installed



Performance

Laboratory Tests were independently conducted.*

Pressure Failure Test

Each size 10-32 Self-Seal test specimen was installed into a test fixture and torqued to 23 inch-pounds. The assembly was then slowly pressurized until rupture or failure. Test specimens utilized silicone O-Rings.

Specimen No.	Failure Pressure (PSIG)	Specimen No.	Failure Pressure (PSIG)
1	25,000	7	20,000
2	24,000	8	19,000
3	20,000	9	22,500
4	20,000	10	20,500
5	22,500	11	20,000
6	25,000	12	27,000

Average Failure Pressure = 24,136 PSIG.

* Laboratory tests were conducted by ITL Independent Testing Laboratories, Costa Mesa, California. Complete certified test results available on all tests.

Helium Mass-Spectrometer Leakage Test

Results: Using a Buna-N O-Ring there were no indications of helium leakage in excess of 5.0 x 10⁻⁵ SCC/Sec.

MIL-S-82496A Test

Twelve MS3212-43 Self-Seal specimens were subjected to the series of consecutive performance tests as specified in MIL-S-82496A.

Test	Parameter	Time	Results
Installation	23 In./Lbs.	—	Complied
Proof	1,500 PSIG	1 Minute	No Leakage
Soak	200°F	70 Hours	Complied
Leakage	1,000 PSIG	5 Minutes	No Leakage
Reverse Leakage	1,000 PSIG	5 Minutes	No Leakage
Endurance	15 Cycle*	—	Complied
Both Leakages	5,10,15 Cycle	5 Minutes	No Leakage

Summary: Self-Seal® fasteners complied with no leakage.

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Self-Seal O-Ring Materials

Materials	Description	Key Uses	Temperature Range (Dry Heat Only)	Color
Buna-N (Nitril)	Most common seal material. Excellent resistance to petroleum-based oils and fuels, silicone greases, hydraulic fluids, water and alcohols. Low compression set, high tensile strength, and high abrasion resistance.	<ul style="list-style-type: none"> • Oil resistant applications. • Low temperature military uses. • Automotive, marine, aircraft fuel systems. • Can be compounded for FDA applications. 	-40°F to +250°F	Black
Viton® (Fluorocarbon)	High temperature resistance and outstanding chemical resistance. Low gas permeability and high resistance to swelling in gasoline and gasoline/alcohol blends. Resists ozone and U.V. light. Perhaps the “ideal” O-ring material.	<ul style="list-style-type: none"> • Aircraft engine sealing. • Automotive fuel handling systems. • Hard vacuum service. • Wide chemical exposure situations. • High temperature/Low compression set applications. 	-20°F to +400°F	Black
Silicone	Made from silicone, oxygen, hydrogen and carbon. Excellent retention of flexibility and low compression set characteristics. One of the widest temperature ranges for elastomers.	<ul style="list-style-type: none"> • Static seal in extreme temperatures. • Medical devices. • Meets FDA regulations. 	-75°F to +450°F	Red
Ethylene Propylene	Ethylene/propylene copolymer (EPM), sometimes combined with a third comonomer (EPDM). Excellent ozone and chemical resistance characteristics. Provides effective resistance to steam (400°F) hot water, silicone oils and greases, dilute acids and alkalies, alcohols and automotive brake fluids.	<ul style="list-style-type: none"> • Outdoor weather resistance. • Hydraulic and automotive brake systems. • Automobile cooling systems. • Water appliances. 	-60°F to +300°F	Black
Fluorosilicone	Combines the good high and low temperature stability of silicone with the fuel, oil, and solvent resistance of fluorocarbon (Viton®). Suitable for exposure to air, sunlight, ozone, chlorinated and aromatic hydrocarbons.	<ul style="list-style-type: none"> • Aerospace fuel systems. • Fuel emission control systems. • Static sealing applications. 	-70°F to +400°F	Blue
Neoprene (Chloroprene)	One of the earliest of the synthetic materials to be developed as an oil resistant substitute for natural rubber. A homopolymer of chloroprene (Chlorobutadiene). Good resistance to ozone, sunlight and oxygen aging; low compression set.	<ul style="list-style-type: none"> • Components in transportation industry. • Recommended for exposure to weathering. • Preferred material for refrigeration industry. • FDA approved for food and beverage industry. 	-45°F to +250°F	Black

How to specify

Self-Seal® fasteners are available in both standard and custom configurations. Ordering part numbers are compiled using the codes for standard Self-Seal fasteners tabulated on the following pages. Below you'll find information on custom Self-Seal products, and how to order them from Long-Lok Fasteners Corp.

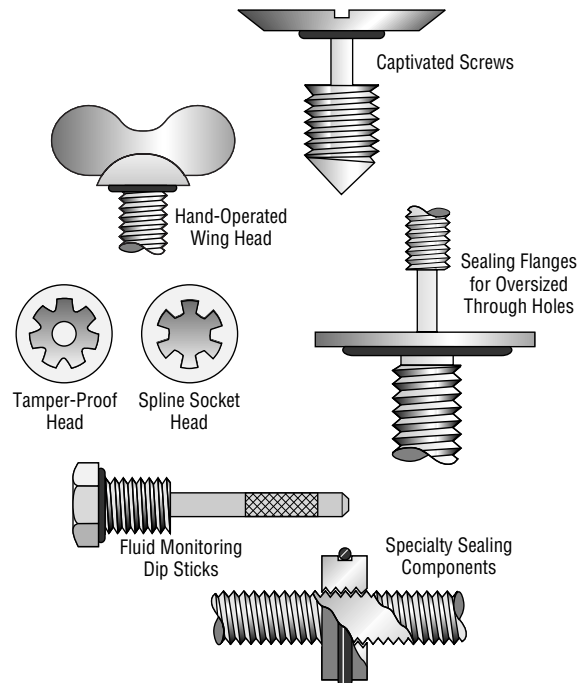
Custom Self-Seal Products

It doesn't have to be exotic to be custom. Self-Seal "customs" simply may be basic fastener types manufactured in a material or finish not offered as standard. Or, Self-Seal "customs" may be highly engineered, non-fastening, multi-piece components of your design, manufactured by Long-Lok. Whichever of these descriptions fit your custom requirements, remember: If it needs to seal tight and seal right, each and every time, Self-Seal products are your best choice.

In addition to the materials and finishes listed in the ordering tables on the following page, Long-Lok can manufacture Self-Seal® fasteners and components using most other common materials and finishes; just let us know if you need something not listed. Most common thread forms, including metric, can be supplied. For materials, finishes or threadforms not referenced, please consult with Long-Lok engineers.

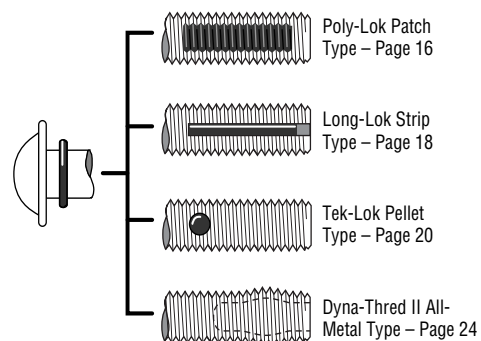
Finally, listed here are items for consideration when thinking of specifying custom Self-Seal fasteners or components. Review these, and then call Long-Lok with your application requirements.

- Type of joint to be sealed
- Fastener length and grip
- Clearance hole size
- Cyclic fatigue stress
- Fastener material
- Fastener finish
- Corrosive conditions
- Shear and tensile strengths
- Head style
- Drive style
- Self-locking requirement
- Captive capability
- Thread class and style
- Environmental conditions for seal
- Fluid to be sealed
- Temperature extremes
- Internal and external pressures



Self-Locking Options for Self-Seal® Fasteners

When shock or vibration are present in your application, consider specifying Self-Seal fasteners manufactured with one of Long-Lok's self-locking methods. In addition to strip and pellet type locking devices, your options include Long-Lok Fastener's exclusive Poly-Lok® patch and Dyna-Thred® II all-metal process. Descriptions of these self-locking options are all within this catalog.



Note: Some self-locking methods may be limited by fastener size.

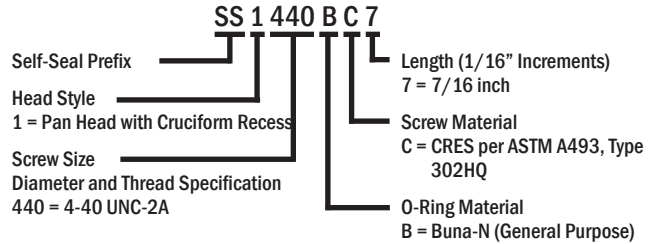
Head Sealing Types

How to specify — Standard Self-Seal Fasteners

Use the tabulated material on these two pages to build part numbers per the examples shown below. Please do not use spaces or dashes.

Example 1:

Note: Part Numbers here are spread apart for clarity. Please do not add spaces between codes when constructing your Part Number.



SELF SEALING FASTENERS

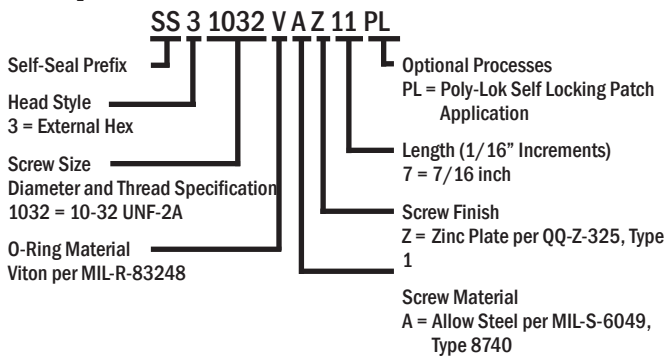
Head Style		
Description		Code
Pan with Cruciform Recess		1
Pan with Slotted Recess		2
External Hexagon		3
100° Flat with Cruciform Recess		4
Button with Cruciform Recess		6
Captive Pan with Slotted Recess		71
Captive Pan with Cruciform Recess		72

Screw Size			
Coarse Threads		Fine Threads	
Size	Code	Size	Code
2-56	256	2-64	264
4-40	440	4-48	448
6-32	632	6-40	640
8-32	832	8-36	836
10-24	1024	10-32	1032
1/4-20	1420	1/4-28	1428
5/16-18	51618	5/16-24	51624

Call Long-Lok for larger diameters.

O-Ring Material		
Material	Specification	Code
Buna-N	General Purpose	B
Ethylene Propylene	ASTM D2000/SAE J200	EP
Buna-N	MIL-P-25732	H
Silicone	FDA Approved	I
Fluorosilicone	MIL-R-25988	K
Ag/Ni Silicone	MIL-G-83528	M
Buna-N	MIL-R-6855	N
Buna-N	MIL-R-7362	R
Silicone	AMS3304	S
Buna-N	FDA Approved	Y
Viton® (Fluorocarbon)	MIL-R-83248	V

Example 2:



Clearance Holes and Installation Torque

Nominal Screw Size		Maximum Clearance Hole (Inches)	Seating Torque (In-Lbs.)
#4	.112-40UNC-2A	.128	5
#6	.138-32UNC-2A	.149	9
#8	.164-32UNC-2A	.177	20
#10	.190-32UNF-2A	.201	23
1/4	.250-20UNC-2A	.266	75

Notes: 1. Do not chamfer holes. Break sharp edges 0.010 inches maximum.
2. Please contact Long-Lok Fasteners for details on other sizes.

SS 3 1032 V A Z 11 P

Screw Material	
Description	Code
Stainless Steel 300 series	C
Alloy Steel	A
400 Series CRES*	L
Low Carbon Steel	S
SAE Grade 5	G5
SAE Grade 8	G8
316 Stainless Steel	9

Screw Finish	
Description	Code
Zinc Plate per QQ-Z-325, Type 1 (clear)	Z
Zinc Plate per QQ-Z-325, Type 2 (gold)	ZZ
Cadmium Plate per QQ-P-416, Type 1, Class 3 (silver)	C
Cadmium Plate per QQ-P-416, Type 2, Class 3 (gold)	CC
Black Oxide per MIL-C-13924	O
Passivated	P
No Plate*	N

Length	
Description	Code
Lengths in increments of 1/16"; tolerances per applicable specifications. Consult factory for minimum thread length requirements.	
Examples:	
1/8"	2
1/4"	4
5/16"	5
3/8"	6
Etc.	Etc.

Optional Processes		
Description	Added Material	Code
Poly-Lok® Patch Type Self-Locking Element	Polyester	PL
	Nylon	LP
Long-Lok® Strip Type Self-Locking Element	Kel-F®	LL
	Vespel®	LV
	Stainless Steel	LH
Tek-Lok® Pellet Type Self-Locking Element	Nylon	TA
	Kel-F®	TL
	Vespel®	TV
Dyna-Thred® All-Metal Self-Locking Process	—	D
Head Drill	—	H
Add Teflon® Washer	—	W
Add O-Groove to 100° Flathead	—	G

*All CRES will be passivated.

See for Yourself

Send us a sample of your part or fastener, along with a brief description of its application and performance requirements, and we'll process it using the most appropriate Long-Lok thread locking or sealing method. Or, to sample a standard Long-Lok fastener, simply supply us with a Part Number. Samples are provided free of charge. Call your nearest Long-Lok facility for assistance.

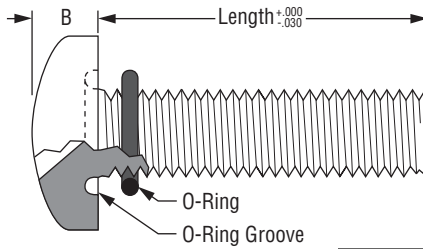
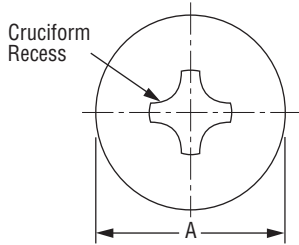
Head Sealing Types

Dimensional Data

To accommodate the O-ring groove, Self-Seal fasteners incorporate heads slightly larger than common bolts and screws. Tabulated here are dimensions for six of the most commonly specified Self-Seal fasteners. For dimensional data on styles or sizes not shown here, please contact Long-Lok.

Reminder: Length is specified in 1/16" increments. Contact Long-Lok for minimum thread lengths and special grip requirements. Unless otherwise specified, Self-Seal fasteners are provided with a full-length thread.

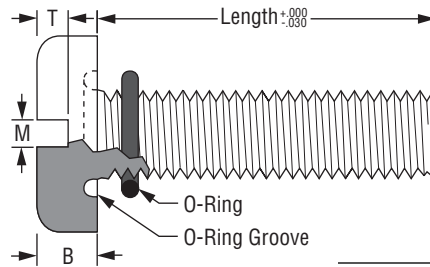
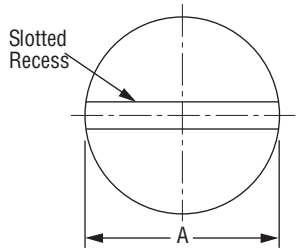
Pan Head – SS1



Note: Pan head Self-Seal® fasteners with cruciform recess are also available under MS3212/MS3213.

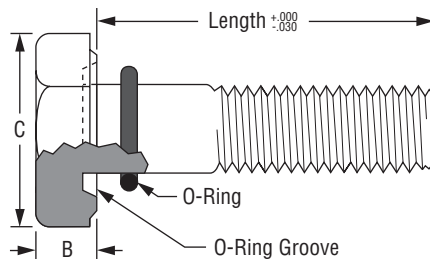
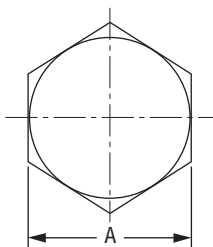
Size	4	6	8	10	1/4
A	.238-.228	.294-.282	.347-.335	.403-.391	.517-.497
B	.080-.075	.097-.092	.115-.109	.133-.126	.175-.170

Pan Head – SS2



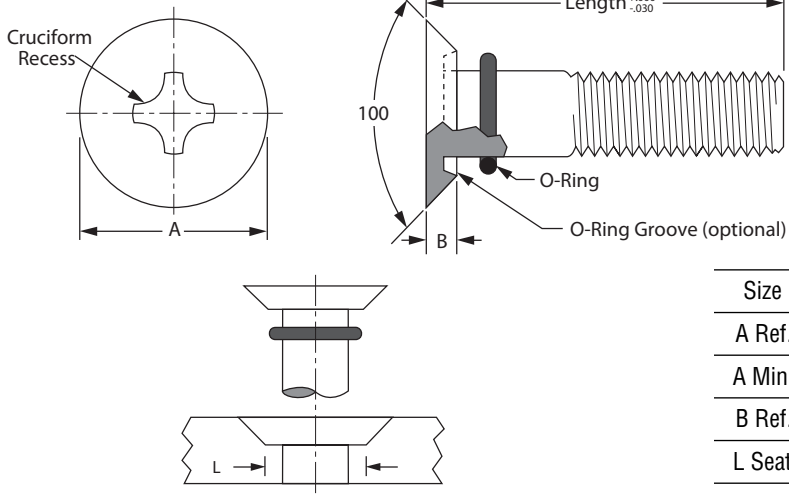
Size	4	6	8	10	1/4
A	.220-.210	.271-.256	.323-.306	.374-.357	.493-.473
B	.070-.065	.083-.076	.097-.090	.113-.100	.148-.133
M	.030-.023	.039-.031	.048-.039	.054-.045	.060-.050
T	.030-.023	.037-.030	.045-.038	.050-.043	.067-.050

Hex Head – SS3



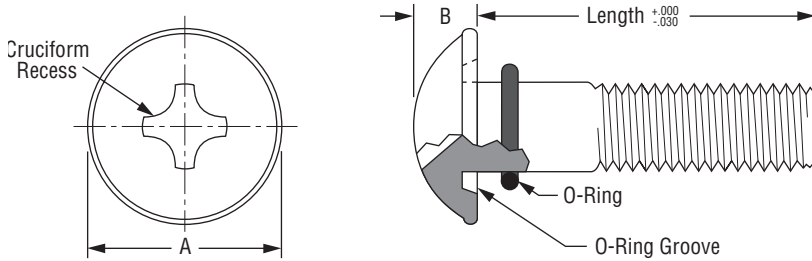
Size	8	10	1/4	5/16	3/8
A	.312-.305	.440-.428	.502-.490	.565-.553	.627-.615
B Ref.	.120	.155	.180	.212	.248
C Ref.	.340	.510	.580	.650	.720

100° Flat Head – SS4



Size	4	6	8	10	1/4
A Ref.	.279-.267	.334-.323	.410-.400	.510-.496	.666-.648
A Min.	.231	.287	.362	.452	.600
B Ref.	.041	.042	.045	.073	.097
L Seat	.164-.162	.226-.222	.274-.268	.286-.278	.388-.380

Button Head – SS6



Size	4	6	8	10	1/4
A	.285-.270	.370-.350	.385-.365	.440-.420	.580-.555
B	.080-.070	.100-.090	.115-.105	.135-.125	.160-.145