ESSENTRA COMPONENTS

Product Guide

THE ULTIMATE GUIDE TO CAPS AND PLUGS

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MAKING IT EASIER

GENERAL PROTECTION

Not every general protection product is suited for every application. Materials play a critical role. For instance, you wouldn't use <u>stud bolt protection caps</u> as a hightemperature masking solution. For starters, they're made of Low Density Polyethylene, which can't stand up to high temperatures, but provides excellent performance for a basic application, such as for storage and transportation.

To help you select the right caps and plugs for your application, we've put together this guide. We strongly recommend that you **try before you buy – request** <u>free samples</u> to ensure that the Essentra product selected matches your requirements.

www.essentracomponents.com/en-gb/samples

WHAT DO YOU WANT TO KNOW?

TYPES OF CAPS AND PLUGS

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A CONTRACTOR

WHEN MATERIALS ARE SIMILAR



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TYPES OF CAPS AND PLUGS

Before you can understand the materials, you need to know the types of caps and plugs available. Caps and plugs are designed for every use in a variety of materials. You can even have them custom made. Decide your priorities and then you can choose the most suitable caps and plugs.

MANUFACTURING

To keep production moving efficiently, always consider the time it takes to apply and remove caps and plugs without damaging threads or profiles; an easy pull plug or <u>tear tab caps</u> work well, for example. If you can adapt your protection to your production methods, you'll work far more productively.

MASKING

Areas you especially need to protect include electrical contact points, threaded holes or studs and welding areas. Materials react differently to processes, so before you actually start masking, request a <u>free</u> <u>sample</u> of the masking product you'd like to use and test it. Keep in mind that caps and plugs aren't your only option. Masking tape might be best for your needs.

STORAGE AND TRANSPORTATION

Components are especially vulnerable to damage and contamination during transportation and storage, which is why caps and plugs are often used to protect critical profiles in those situations. <u>Tapered round plugs</u> <u>with flange</u>, for example, are often used for storage and transportation, providing protection against dirt, debris, moisture and corrosion.

END USE

Caps and plugs are often used to finish off a product, such as furniture or panels. <u>Decorative hex bolt caps</u> or a <u>round ferrule</u> are good examples, while also providing protection.







TAPERED CAPS AND PLUGS

Tapered caps and plugs have just that: a tapered design, which covers several diameters. They provide a tight fit, protecting your application from contamination, damage and corrosion during storage and shipment.

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PUSH FIT CAPS

Protect internal and external profiles during assembly and transit. Push fit caps are ideal for this purpose. They're available in different styles and materials suited to your application.

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VINYL CAPS

Vinyl caps provide a level of flexibility that allow for stretching without tearing or splitting. The result is a snug fit that's just as easy to remove.

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THREADED CAP AND PLUG

Threaded caps and plugs are most often used as protection on hydraulic hose fittings. They provide a quick fit to threaded components and can serve as metric threaded caps, BSP pipe plugs – they also fit UNF thread sizes.

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QUICK FIT AND/OR REMOVAL PLUGS

Quick fit plugs have a short thread to allow for a fast fit. Their knurled head provides an easy grip to speed up the installation and removal process even more.

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PROTECTION

FOR PROFILES

PROTECT THREADS

SPECIALITY CAPS AND PLUGS

MASKING PROTECTION

Caps and plugs designed for masking provide protection from surface treatment in applications which require different levels of temperature and chemical resistance. These are available in different materials and offer varying temperature tolerances. The one you choose will depend on the masking application you're using.

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PROTECTION FOR PIPES AND FLANGES

From Flange Protector Retainer Plugs to Pipe Caps, you can keep pipes and flanges safe and sound, free from damage and contamination. These caps and plugs offer firm and secure protection in different styles.

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PROTECTION FOR HYDRAULICS

Hydraulics has its own safety demands and standards, which is why specialist caps and plugs are essential for protection. The range of solutions available is vast, from banjo union caps to quick release plugs.

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MATERIALS **OVERVIEW**

How do you know which material you should use for your application? To give you a head start, here's a quick look at the characteristics of materials for caps and plugs:

PLASTICS

MATERIAL	CHARACTERISTICS
LOW-DENSITY POLYETHYLENE (LDPE)	Flexible, economical, good chemical resistance
HIGH-DENSITY POLYETHYLENE (HDPE)	Excellent resistance to most chemicals, but poor resistance to oil and grease
ETHYLENE VINYL ACETATE (EVA)	Good chemical and stress-crack resistance; works well for electrical applications
NYLON	Tough material with good thermal and chemical resistance
POLYPROPYLENE (PP)	Good chemical and heat resistance
POLYVINYL CHLORIDE (PVC)	Flexible, withstands high temperatures
THERMOPLASTIC ELASTOMERS (TPE)	Soft, resistant to UV rays. Some manufacturers class TPE as a rubber
COPOLYESTER	Blend of different polyesters; high clarity and transparency with excellent chemical resistance

RUBBER

MATERIAL	CHARACTERISTICS
ETHYLENE PROPYLENE DIENE MONOMER (EPDM)	Highly flexible; similar to silicone but has lower temperature resistance
SILICONE	Resistant to high and low temperatures

OTHER MATERIALS

MATERIAL	CHARACTERISTICS
VINYL	Withstands high temperatures. Durable and abrasion and moisture resistant
THERMOPLASTIC RUBBER (TPR)	High resistance to chemicals; combines the properties of rubber with the moulding capabilities of thermoplastics
PAPER (CREPE)	High degree of flexibility, low cost and recyclable
PVC	A type of vinyl. Popular in the construction industry for its durability and cost.

WHEN MATERIALS ARE **SIMILAR**

This often makes choosing a material for your caps and plugs difficult. Here are the differences in the materials that many find confusing. You can find a material's specific properties on pages 15-25.

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LDPE VS HDPE



They're both made of polyethylene (PE), one having low and the other, high density.

In fact, LDPE has a density in the range between 0.910 and 0.925 gm/cm3. HDPE, within the range of 0.941 to 0.965 gm/cm3.

As to characteristics, LPDE has a high ductile nature and mediocre tensile strength. HPDE has high tensile strength. Both LDPE and HDPE are flexible. LDPE stretches and conforms better to surfaces than HDPE, which is tougher and more rigid. Here's a more in-depth look at LDPE vs. HDPE.

EPDM VS POLYPROPYLENE



Polypropylene is a thermoplast polymer.

Like HDPE, it's rugged and can resist chemical solvents and acids. However, they differ in density, with polypropylene between 0.895 and 0.92 g/cm², making it more flexible than HDPE. Another difference is that polypropylene has poor UV resistance.

EPDM VS SILICONE



Both are rubbers. EPDM is popular in the automotive and construction industries.

Your car's door and window seals are most likely EPDM, for example. Silicone has a longer life than EPDM, but the main difference in these two materials comes down to their ability to withstand extreme temperatures. Silicone is the runaway winner. Here's a closer look at <u>EDPM vs. Silicone</u>.

TPE VS TPR



Both materials belong to the family of thermoplastic elastomers. TPR has qualities that combine the properties of rubber with the moulding capabilities of thermoplastics.

Yet these two materials are so much alike in their characteristics. Both have high-flexural fatigue resistance, high-impact strength – even their temperature ranges are the same. The difference comes down to their base materials.

TPE is modified from Styrene Ethylene Butylene Styrene Block Copolymer (SEBS) and has a lower density than TPR. TPR is often modified from styrene-butadiene-styrene block copolymer (SBS). The result is that TPE is essentially a softer version of TPR. Here's a more in-depth look at <u>TPE vs TPR</u>.

INDUSTRIES: WHICH SOLUTIONS?

Not every material works for every cap and plug, of course. Here's a glance at examples of what material works best in specific applications.

EQUIPMENT MANUFACTURING

Blanking plugs, for example, are often used to finish off panel holes on a piece of equipment, giving it a nice, clean finish and providing safety against sharp edges. They're available in different materials, but which should you choose and why?



Your choice will depend on the equipment being manufactured. If you're dealing with irregular shapes, or wires and cables that will need to be accessed, you want a flexible material for your blanking plug which can easily be removed when needed. This is why the automotive industry uses flexible blanking plugs. If it's a straightforward job, and the blanking holes are merely there for appearance, then nylon will fulfil your need. It's a hard, long-lasting material. If you want a clear plug, opt for copolyester.

BLANKING PLUG

Choose nylon or copolyester for rigidity and durability

<u>View online</u> ☑



BODY PLUGS

These push in plugs for panels come in silicone or TPR for flexibility, covering multiple diameters



View online 🗹

MASKING

For masking to be successful, your material selection is critical. It's got to behave as required during wet painting, powder coating, e-coating, anodizing, plating, blasting and drying. Your material has to stand up to the operating temperature that your application requires. Before you actually start masking, request free samples of the masking product you'd like to use and test it.

Masking tape can also give you a very economical, easy-to-use solution. For instance, if you're masking sheet metal, tape is easy to apply and remove.

WHICH MATERIAL FOR YOUR MASKING APPLICATION?

	[Material					
Application	Silicone	Polyimide Tape	Silicone Tape	Glass Cloth Tape	EPDM	High-Temp PVC	TPR / TPE	Paper	Polyester	High-Temp Crepe
Feature	Premium; reusable	Premium; excellent solvent	Self bonding: Perfect for irregular shapes	Durable; for blasting or thick coatings	Around 30% less than silicone	Low cost; not reusable	Lightweight	Low cost; recyclable	No shrinkage	Special high- temp formula
Powder Coating	ø	Ø	ø	Ø	۷	Ø	ø	ø	ø	
E-coating	ø	۷	ø	۷	٢	۷	V		Ø	
Anodizing	ø	Ø	ø		۷	۷	ø		ø	
Plating	ø	۷	۷		٢	۷	v		ø	
Wet Paint	ø	ø	ø	ø	۷	ø	v	ø	ø	Ø
Blasting	ø			۷	۷		v			
Max Temp	+250°C +482°F	+260°C +500°F	+204°C +399°F	+180°C +356°F	+150°C +302°F	+170°C +338°F	+95°C +203°F	+120°C +248°F	+150°C +302°F	+204°C +399°F

*Please note that due to the number of variables in each process such as temperature and pre-treatment, Essentra recommends that a free sample is requested to test in application. We do not assume any liability for the materials, specifications or information provided. For complete temperature and other physical properties of our product's material, please refer to the actual product material technical data sheet (available upon request).

EASY-PULL

View online ☑

MASKING CAPS

High temperature rubber cap in silicone & EPDM; Also, PVC

MASKING SOLUTIONS TO CONSIDER, depending on the process you're using:

MASKING PULL PLUGS View online 🗹

Available in Silicone & TPR



MASKING FLANGELESS PLUGS View online 团

Available in EPDM & TPR



COLOURED MASKING TAPE - DISCS View online 전 Available in polyimide



MASKING WASHER CAPS

Available in silicone



VEHICLES

The concern here is with precision. Key vehicle parts to protect are:

- Diesel/petrol pumps
- Engines
- Specialist vehicle fittings
- Powertrains
- Brake systems



What materials will help you protect fuel lines with integrity? The aim should be to prevent contamination while protecting threads from damage during shipment and masking. For ideas on masking solutions, see the Masking section within this guide.

LDPE is usually used to protect products during transit and storage. It's relatively rigid and offers a secure fit for maximum protection, with good impact resistance. Its protection parts are sometimes threaded so that it can be screwed onto threaded studs and removed without too much fuss. An example of unthreaded LPDE solution is a **grease nipple cap**, which protects grease nipples from dirt ingress when not engaged with its mating part.

Vinyl offers a snug fit, even for small dimensions or irregular shapes. Despite its softness, vinyl resists tearing, cracking, splitting and shredding and is easy to remove. Vinyl caps provide an airtight seal while also insulating and cushioning. If your first priority is shock resistance, vinyl offers excellent protection during transport and handling.

BANJO BOLT CAP

View online 🗹

Bolt caps made of LDPE for assembly, storage and transportation



View online 🗹

SIDE PULL PLUGS

Pull tab feature designed for fast, easy removal; Available in LPDE and TPR

QUICK-FIT CONNECTOR PLUGS

View online 🗹

Protects fuel systems; ring tab allows for easy removal; available in LDPE



THREADED PROTECTION CAPS -BSP/GAS THREADS

View online ☑ Protects threaded components from dust, moisture and damage; LPDE



HOSES AND HYDRAULICS

You'll need specialist protection to ensure the safe operation of any fluid hydraulic component.

A cap or a plug will protect the coupling whilst minimising the impact of fluid spills and maintaining hose integrity. Common materials for caps and plugs for this application include LDPE, HDPE, TPE and PVC.



LDPE material is both cost effective and efficient. For these applications, caps are flexible and easy to fit and do an excellent job of sealing hydraulic applications from damage during transit, heat, dirt, moisture and corrosion. HDPE is more rigid and resists solvents, which can be an important factor in hydraulics. TPE's broad temperature range means it can withstand the outdoors well. Its ability to be soft enables it to shape to fit and retain its position.

QUICK RELEASE PLUGS

View online 🗹

Made of TPE for excellent flexural fatigue resistance





THREADED

LDPE protects against contamination and PP provides good chemical resistance





LDPE protects O-ring face seal connectors



THREADED SEALING CAPS

View online 🗹

HDPE caps are resistant to solvents and reduce potential shearing



DRIVESHAFT PROTECTION CAPS

View online 🗹

Available in flexible PVC and LDPE to protect driveshaft and surrounding bearings



PIPE PROTECTION

Materials aren't quite as varied when it comes to industrial pipe protection, but you still have some decisions to make: LPDE, PE and vinyl.

You have to check these materials off against the three areas that matter most to your pipes, and prioritise them in order of importance to you:

- Durability against impact
- Ease of use
- Quality of your materials



FLEXIBLE PIPE CAPS

Flexible PE allows for

easier fitting

RIBBED PIPE-END PLUGS View online ☑

LDPE flexible ribs of different diameters provide friction fit

FACE PROTECTORS -BARRELED

View online 🗹

Durable PE protects flange face against dirt, moisture, paint, sand and short blasting; tapered section creates strong adhesion to the collar of the pipe; fasteners not required









MATERIALS AND **PROPERTIES**

Below is a list of materials, and their properties, commonly associated with caps and plugs. Note, these are not the properties of the caps and plugs themselves, but of the material.

Materials can be formulated to enhance or take on specific qualities. Still, it's a good starting point for understanding certain materials.



LOW DENSITY POLYETHYLENE (LDPE)

The most popular choice for caps and plugs for using as protection during transport, and not just because of its low cost relative to other materials. LDPE is rigid, but compared to Nylon or HDPE, it's soft. It also has high impact strength and a reputation as a cross between elastomers and thermoplastics. LDPE can withstand the cold, specifically temperatures down to 0°C before it becomes brittle. When placed in high temperatures, it quickly becomes soft.

GENERALLY, LDPE OFFERS:		
TENSILE STRENGTH	0.20 - 0.40 N/mm²	
NOTCHED IMPACT STRENGTH	no break Kj/m²	
THERMAL COEFFICIENT OF EXPANSION	100- 220 x 10-6	
MAX CONT USE TEMP	65°C/149°F	
DENSITY	0.917 - 0.930 g/cm3	

RESISTANCE TO CHEMICALS:		
DILUTE ACID	Excellent	
DILUTE ALKALIS	Excellent	
OILS AND GREASES	Moderate (variable)	
ALIPHATIC HYDROCARBONS	Poor	
AROMATIC HYDROCARBONS	Poor	
HALOGENATED HYDROCARBONS	Poor	
ALCOHOLS	Excellent	

EXAMPLES OF LDPE CAPS AND PLUGS

HEXAGONAL CAP

View online 🗹

LDPE caps also protect round components on hydraulic applications



NPT THREAD PLUG

View online 🗹

Designed for use with BSP/NPT tapered threaded fittings



SNAP FIT PLUG

View online 🗹

Centre tab enables tight grip for easy application and removal



HIGH DENSITY POLYETHYLENE (HDPE)

HDPE is a stiff, strong, high-density material and similar to LDPE in opacity and impact resistance. With good chemical resistance and low permeability to gases and moisture, it's a good-although not the most common-choice for protecting NPT thread ports from dirt and other contaminants.

GENERALLY, HDPE MATERIAL HAS:		
TENSILE STRENGTH	0.20 - 0.40 N/mm²	
NOTCHED IMPACT STRENGTH	no break Kj/m²	
THERMAL COEFFICIENT OF EXPANSION	100- 220 x 10-6	
MAX CONT USE TEMP	65°C/149°F	
DENSITY	0.944 - 0.965 g/cm3	

RESISTANCE TO CHEMICALS:		
DILUTE ACID	Excellent	
DILUTE ALKALIS	Excellent	
OILS AND GREASES	Moderate (variable)	
ALIPHATIC HYDROCARBONS	Poor	
AROMATIC HYDROCARBONS	Poor	
HALOGENATED HYDROCARBONS	Poor	
ALCOHOLS	Excellent	

EXAMPLES OF HDPE CAPS AND PLUGS

THREADED PROTECTION PLUGS - NPT THREADS

View online 🗹

Easy-to-grip head design; also available in nylon



THREADED SEALING CAPS - UNF THREADS

View online ☑

Protection while limiting fluid leakage



THREADED O-RING PLUG - METRIC THREADS

View online 🗹

Water-tight seal to protect against leakage; also available in nylon



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NYLON

Nylon is a tough material with good thermal and chemical resistance. It's incredibly strong and can be used in place of low-strength metals. It's a popular material, used to make everything from fasteners to cable ties. Nylon 6.6, a variant, is stronger and absorbs less moisture than Nylon. It's the ideal material when high level of torque is required.

GENERALLY, NYLON MATERIAL HAS:		
TENSILE STRENGTH	90 - 185 N/mm²	
NOTCHED IMPACT STRENGTH	5.0 - 13 Kj/m²	
THERMAL COEFFICIENT OF EXPANSION	90 - 20/70 x 10-6	
MAX CONT USE TEMP	130°C / 266°F	
DENSITY	1.13 - 1.35/1.41 g/cm3	

RESISTANCE TO CHEMICALS:		
DILUTE ACID	Poor	
DILUTE ALKALIS	Moderate	
OILS AND GREASES	Excellent	
ALIPHATIC HYDROCARBONS	Excellent	
AROMATIC HYDROCARBONS	Excellent	
HALOGENATED HYDROCARBONS	Good (Variable)	

EXAMPLES OF NYLON CAPS AND PLUGS

THREADED PROTECTION PLUGS - WIDE FLANGE

View online 🗹

Absorbs paint and keeps flaking at a minimum avoiding contamination upon removal



SHEET METAL PLUGS

View online 🗹

Designed to cover holes in metal sheets - easy to fit and remove



SLOTTEX PLUGS

<u>View online</u> ⊠

Screw-on protection plugs applied or removed with screwdriver, spanner or socket; tightened manually with or without power tool; also available in HDPE



ETHYLENE VINYL ACETATE (EVA)

Flexible even in low temperatures, EVA has good chemical and stress-crack resistance and its properties work well for electrical applications. Good cushioning performance add an extra touch of protection, which is why it's often used for handles. It's also an ideal material for plugging hydraulic hoses. Look for ones with ribs – these plugs provide a comfortable, snug fit without stretching th<u>e hose.</u>

EVA is also excellent at protecting applications from dust ingress and damage.



GENERALLY, EVA MATERIAL OFFERS:		
TENSILE STRENGTH	0.05 - 0.2 N/mm²	
NOTCHED IMPACT STRENGTH	No break Kj/m²	
THERMAL COEFFICIENT OF EXPANSION	160 - 200 x 10-6	
MAX CONT USE TEMP	55°C - 65°C / 131°F - 149°F	
DENSITY	0.926 - 0.950 g/cm3	

RESISTANCE TO CHEMICALS:		
DILUTE ACID	Excellent	
DILUTE ALKALIS	Excellent	
OILS AND GREASES	Good	
ALIPHATIC HYDROCARBONS	Excellent	
AROMATIC HYDROCARBONS	Poor	
HALOGENATED HYDROCARBONS	Poor	
ALCOHOLS	Excellent	

EXAMPLE OF AN EVA PLUG

PULL-TAB CAPS

View online 🗹

Good tensile strength, toughness and increased flexibility; also available in PVC



DENSITY

THERMAL COEFFICIENT O MAX CONT USE TEMP

POLYPROPYLENE (PP)

Polypropylene caps are known for good impact strength, cost-effectiveness, and pliability. The material is considered tough, though it can act with elasticity. It doesn't suffer stress-cracking problems. It has excellent fatigue resistance, retaining its shape after a lot of torsi

after a lot of torsion.	
Polypropylene also offers excellent electrical electronics. Not suited for freezing temperat	resistance, so it's often used in tures, where it can become brittle.
GENERALLY, POLYPROPYLENE MATERIAL C	DFFERS:
TENSILE STRENGTH	0.95 - 1.30 N/mm²
NOTCHED IMPACT STRENGTH	3.0–30.0 Кј/m²
THERMAL COEFFICIENT OF EXPANSION	100 - 150 x 10-6

RESISTANCE TO CHEMICALS:	
DILUTE ACID	Very good
DILUTE ALKALIS	Very good
OILS AND GREASES	Moderate (variable)
ALIPHATIC HYDROCARBONS	Poor
AROMATIC HYDROCARBONS	Poor
HALOGENATED HYDROCARBONS	Poor
ALCOHOLS	Very good

65°C/149°F

0.905g/cm3

EXAMPLE OF A PP PLUG

THREADED O-RING PLUGS - UNF THREADS

View online 🗹

Compressing flange lip and O-ring for a watertight seal



POLYVINYL CHLORIDE (PVC)

PVC is a very durable and long-lasting material. It's also flexible, and as a cap or plug, this means they're easy to fit and provide an excellent seal. PVC won't crack or shred, as hard plastics can do, leaving residue on the area they're meant to protect from contamination.

PVC can withstand high temperatures, making these caps and plugs good for all masking applications except blasting. Its chemical resistance makes it especially suitable for plating. It's also an insulative material, which makes it a good choice for enclosures with electrical applications.

GENERALLY, PVC MATERIAL OFFERS:	
TENSILE STRENGTH	2.60 N/mm²
NOTCHED IMPACT STRENGTH	2.0–45.0 Kj/m²
THERMAL COEFFICIENT OF EXPANSION	80 x 10-6
MAX CONT USE TEMP	65°C/ 149°F
DENSITY	1.38g/cm3

RESISTANCE TO CHEMICALS:	
DILUTE ACID	Very good
DILUTE ALKALIS	Very good
OILS AND GREASES	Good (variable)
ALIPHATIC HYDROCARBONS	Very good
AROMATIC HYDROCARBONS	Poor
HALOGENATED HYDROCARBONS	Moderate (variable)
ALCOHOLS	Good (variable)

EXAMPLES OF PVC CAPS AND PLUGS

FLEXIBLE END CAP

View online 🗹

Provides tight fit for metric, BSP and UNF threads



TAPERED CAP

View online 🗹

Good tensile strength, toughness and increased flexibility; also available in EVA



THERMOPLASTIC ELASTOMERS (TPE)

A thermoplastic elastomer, TPE is considered more of a rubber by some manufacturers because of its characteristics. Dense, flexible and soft, TPE offers excellent weather and ozone resistance. With good tear and abrasion resistance, TPE also has excellent flexural fatigue resistance and high impact strength.

GENERALLY, TPE MATERIAL OFFERS:	
TENSILE STRENGTH	0.5 - 2.4 N/mm²
NOTCHED IMPACT STRENGTH	No break Kj/m²
THERMAL COEFFICIENT OF EXPANSION	130 x 10-6
MAX CONT USE TEMP	95°C/ 203°F
DENSITY	0.91 - 1.3 g/cm3

RESISTANCE TO CHEMICALS:	
DILUTE ACID	Excellent
DILUTE ALKALIS	Excellent
OILS AND GREASES	Excellent
ALIPHATIC HYDROCARBONS	Excellent
AROMATIC HYDROCARBONS	Poor
HALOGENATED HYDROCARBONS	Poor
ALCOHOLS	Excellent

EXAMPLES OF A TPE CAP

HOSE WASHER CAPS

<u>View online</u> ⊠

Keeps hose or tube ends from sliding over fittings



ETHYLENE PROPYLENE DIENE MONOMER (EPDM)

Used mainly as a masking product, EPDM is versatile enough to also act as a protection solution. It's generally a less expensive alternative to silicone. It has excellent weather resistance, which is why it's popular as a roofing material in construction. The automotive, oil and gas industries like caps and plugs made from EPDM for its resistance to acids and alkalis. EPDM's flexibility makes it an ideal masking solution for sealing round and irregular shapes.

GENERALLY, EPDM MATERIAL OFFERS:	
RESISTANCE TO WEATHER AND UV RAYS	Excellent
WATER RESISTANCE	Excellent
CHEMICAL RESISTANCE	Excellent
TEAR RESISTANCE	Moderate
RESISTANCE TO GAS PERMEABILITY	Excellent
RESISTANCE TO AGEING DUE TO STEAM	Excellent
COMPATIBILITY WITH KETONES	Excellent
COMPATIBILITY WITH ALCOHOLS*	Excellent

*EPDM has poor compatibility with the alcohol Hexyl

RESISTANCE TO CHEMICALS:	
TEMPERATURE RANGE	-40°C to 150°C / -40°F to 302°F
TENSILE STRENGTH ELONGATION	500-2500 P.S.I 600% Maximum
DUROMETER RESILIENCE/REBOUND	30-90 Shore Good

EXAMPLES OF EPDM CAPS AND PLUGS

MASKING STRAIGHT CAP

View online \square

Masks threaded or non-threaded components during finishing processes; also available in silicone



MASKING CONES

View online 🗹

Can be used as a cap or plug in masking processes



SILICONE

Silicone is excellent at resisting high temperatures, making it the ideal material for masking. An excellent example: silicone tapered plugs. However, silicone's abrasion resistance is poor, though it can stand up to repeated production runs and conditions without wearing, breaking or degrading. And while it is ill-suited as a vibration insulator, it's an excellent choice as an electrical insulator. Silicone's flexibility allows for easy installation in the masking process, while providing an airtight seal.

GENERALLY, SILICONE MATERIAL OFFERS:	
RESISTANCE TO WEATHER AND UV RAYS	Poor
WATER RESISTANCE	Excellent
CHEMICAL RESISTANCE	Very good (Variable)
TEAR RESISTANCE	Poor
RESISTANCE TO GAS PERMEABILITY	Poor
RESISTANCE TO AGEING DUE TO STEAM	Poor at temperatures over 150°C / 302°F
COMPATIBILITY WITH KETONES	Poor to fair
COMPATIBILITY WITH ALCOHOLS*	Poor

RESISTANCE TO CHEMICALS:	
TEMPERATURE RANGE	-55°C to 250°C /-67F° to 482°F
TENSILE STRENGTH ELONGATION	Maximum 11 N/mm² 100%–1100% Maximum
DUROMETER RESILIENCE/REBOUND	10-90 Shore A Good

EXAMPLES OF SILICONE CAPS AND PLUGS

USB & RJ PLUG - USB-B CONNECTOR TYPE

<u>View online</u> ⊠

Protects unused connector ports on electrical components



MASKING STAR TUBES View online ⊠

Masks long studs and pins where caps are too short



MASKING PULL PLUGS

View online 🗹

Masks threaded and plain through-holes; flexible to allow slight variation in different sizes



THERMOPLASTIC RUBBER (TPR)

Lightweight with good tear strength, TPR has qualities that combine the properties of rubber with the moulding capabilities of thermoplastics. It holds its shape, comes in varying levels of flexibility and has excellent electrical properties. Good tear strength, reusable and recyclable, TPR is an ideal solution for masking protection.

GENERALLY, TPR MATERIAL OFFERS:	
RESISTANCE TO WEATHER AND UV RAYS	Excellent
WATER RESISTANCE	Excellent
CHEMICAL RESISTANCE	Excellent
TEAR RESISTANCE	Good
RESISTANCE TO GAS PERMEABILITY	Excellent

RESISTANCE TO CHEMICALS:	
TEMPERATURE RANGE	-40°C to 95°C /-40°F to 203°F
TENSILE STRENGTH ELONGATION	500% - 620%
DUROMETER RESILIENCE/REBOUND	20 Shore OO to 85 Shore D

EXAMPLES OF TPR CAPS AND PLUGS

PARALLEL PROTECTION PLUG

View online 🗹

Protects connectors while providing clean finish; also available in LPDE, vinyl and PVC



SIDE PULL-TAB PLUG

View online 🗹

Easy removal, even in difficult positions; also available in LDPE



FLEXIBLE END CAP - ACID RESISTANCE

View online 🗹

Hanging tab to work with round wire hooks and other support wire hooks



PAPER (CREPE)

Caps and plugs made of crepe paper are a low-cost alternative to silicone. Used for masking in painting and powder-coating applications, it can stand up to high temperatures.

Made from a blend of virgin pulp and post-consumer recycled paper, it's a good option when you need environmentally friendly solutions.

GENERALLY, CREPE PAPER HAS:

TEMPERATURE RANGE

204°C/399°F

EXAMPLES OF TPR CAPS AND PLUGS

TAPERED PAPER CAPS

View online 🗹

Good flexibility, easily stretching to cover a surface for masking



PAPER MASKING PLUGS

View online 🗹

Does not promote condensation. 100% recyclable



MATERIAL VS CHEMICALS

It's critical to choose a general-protection material capable of standing up to chemicals. Chemicals can include anything from water to acid, so no matter what your application's environment, you need to carefully consider the material you use. To learn more, check out <u>Chemical resistance, caps and plugs - www.</u> essentracomponents.com/en-gb/news/product-resources/chemical-resistance-caps-and-plugs

MATERIALS VS SHOCK VIBRATIONS

During transport, caps and plugs are vulnerable to damage due to bumps and falls. This is why choosing a material with shock absorption is critical. Find out more in <u>Caps and plugs, shock absorption and</u> <u>preventing damage in transit. https://www.essentracomponents.com/en-gb/news/product-</u> <u>resources/caps-and-plugs-shock-absorption-and-preventing-damage-in-transit</u>

WHAT EXACTLY IS SHORE HARDNESS?

The shore hardness of materials is important for your application. Get it wrong, and your application could fail. Check out everything you need to know in <u>What's shore hardness and why should you care? https://</u>www.essentracomponents.com/en-gb/news/product-resources/whats-shore-hardness-and-why-should-you-care

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