

High-performance Thermoplastic Elastomer

NOF[®]-ALLOY TZ series

1 Introduction

NOF[®]-ALLOY TZ Series is a high-performance thermoplastic elastomer which consists of acrylic rubber and polyolefin (or polyester). It is well-known that there isn't good compatibility between acrylic rubber and polyolefin (or polyester) because these materials have different polar characters. On the other hand, **NOF[®]-ALLOY TZ Series** contains a special graft copolymer which can disperse acrylic rubber in polyolefin (or polyester) finely. Therefore, **NOF[®]-ALLOY TZ Series** has some excellent properties, especially oil-resistance and high thermal-resistance.

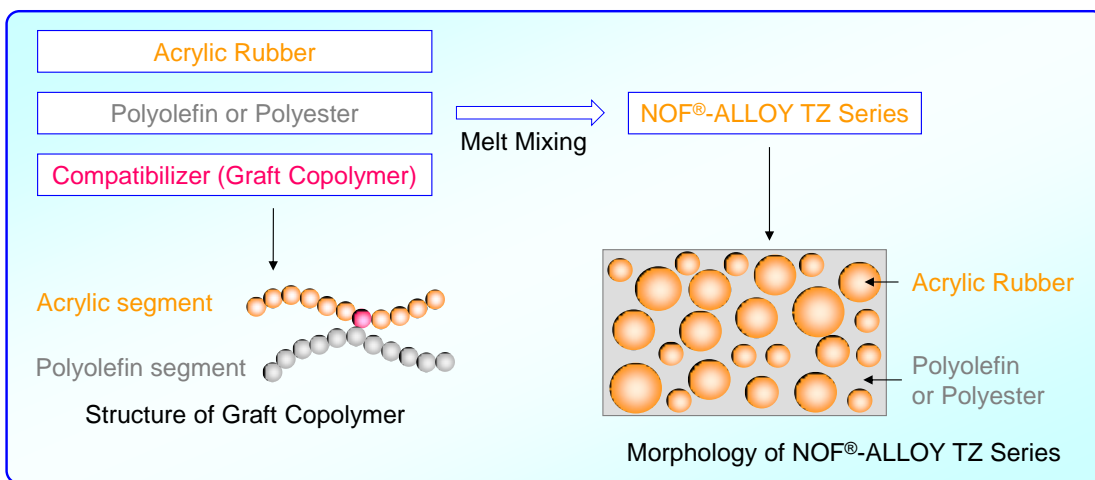


Fig.1 Schematic representation of NOF[®]-ALLOY TZ Series

2 Features of NOF[®]-ALLOY TZ Series

① Excellent soft elasticity

NOF[®]-ALLOY TZ Series has an excellent compression set which can touch like rubber. Furthermore, this excellent compression set can be sustained for long time.

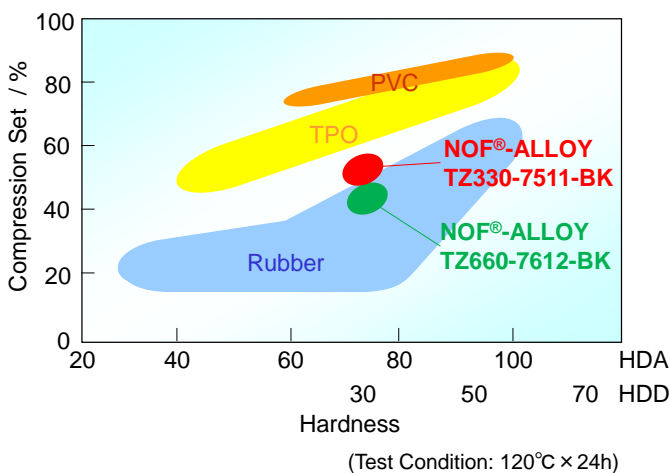


Fig.2 Compression set data base on hardness

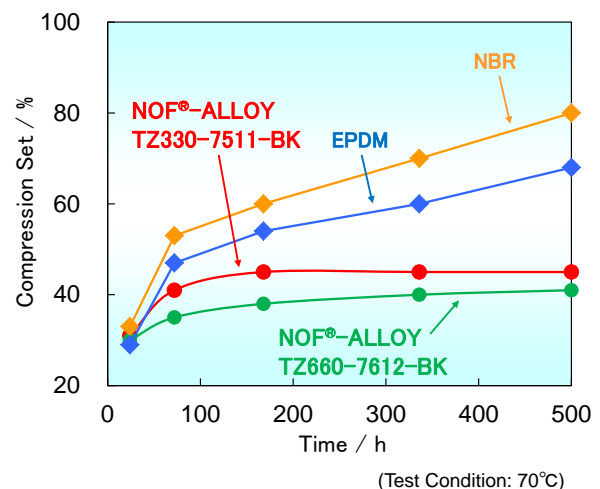
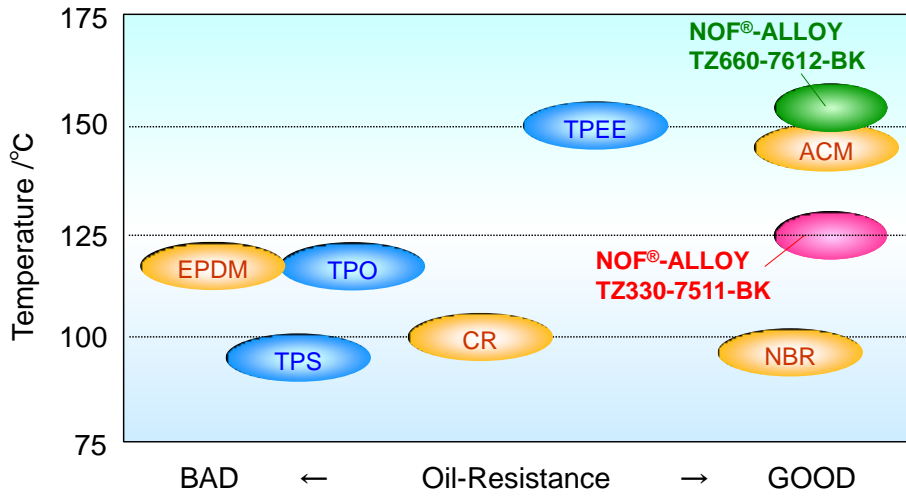


Fig.3 Compression set data base on time

② Excellent oil and heat resistance

NOF[®]-ALLOY TZ Series shows both excellent oil-resistance and high thermal-resistance properties in comparison to other materials.



TPO : Thermoplastic olefin elastomer TPS : Thermoplastic styrene elastomer
 TPEE : Thermoplastic polyester elastomer EPDM : Ethylene-propylene-diene rubber
 CR : Chloroprene rubber NBR : Acrylonitrile-butadiene rubber
 ACM : Acrylic rubber

Fig.4 Comparison of Oil-resistance and Heat-resistance

③ Excellent adhesion property

NOF[®]-ALLOY TZ Series has an excellent adhesive property for other resins. Due to this property, **NOF[®]-ALLOY TZ Series** can be molded with other resins by two-color molding method.

Table 1 Adhesion for resins

Resin	NOF [®] -ALLOY TZ330-7511-BK	NOF [®] -ALLOY TZ660-7612-BK
PP	Adhesive	No Adhesive
ABS	No Adhesive	Adhesive
PC	No Adhesive	Adhesive
PC/ABS	No Adhesive	Adhesive
PBT	No Adhesive	Adhesive

(Evaluation method)

1. The other resin plate is set into a cavity of the mold.
2. NOF[®]-ALLOY is molded toward the plate by injection method.
3. The adhesion property of the interface between NOF[®]-ALLOY TZ and other resins is checked by peeling.

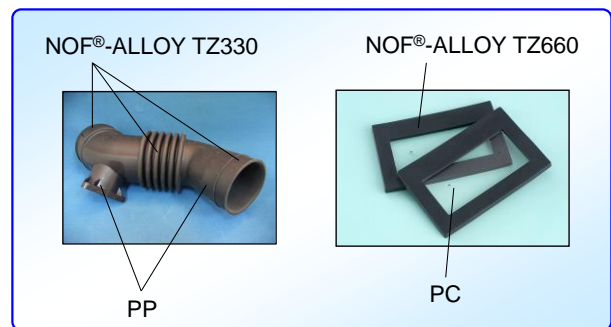


Fig.5 Two-color molding

3 Physical properties of NOF[®]-ALLOY TZ Series

The physical properties of **NOF[®]-ALLOY TZ 330 Series** and **NOF[®]-ALLOY TZ 660 Series** are shown in Table 2.

Table 2 Physical properties of NOF[®]-ALLOY TZ Series

Item	Test method	Unit	Normal grade	High thermal-resistance grade	
			NOF [®] -ALLOY TZ330-7511-BK	NOF [®] -ALLOY TZ660-7612-BK	
Physical properties	Specific gravity	ASTM D 792 (JIS K 6268)	—	1.00	1.13
	Melt flow rate ¹⁾	ASTM D 1238 (JIS K 7211)	g/10min	8	3
	Hardness ²⁾	ASTM D 2240 (JIS K 6253)	—	A75	A79
Mechanical properties	Strength at break ³⁾	ASTM D 412 (JIS K 6251)	MPa	4	7
	Elongation at break ³⁾		%	200	200
	100% Modulus ³⁾		MPa	3	5
Thermal property	Brittleness temperature	ASTM D 746 (JIS K 7216)	°C	-45	-47
Property like rubber	Compression set ⁴⁾	ASTM D 395 (JIS K 6262)	%	58	40
Oil resistance	Ratio of weight change ⁵⁾	ASTM D 471 (JIS K 6258)	%	15	5
Melting point			°C	155	225
Available temperature range			°C	-40~120	-40~150

1) TZ330; 190°Cx5kg, TZ660; 230°Cx10kg, 2) 5 seconds later, 3) Number 3 dumbbell shaped specimen, elongation rate; 500mm/min

4) 120°Cx24h, 25% compression 5) IRM903 oil (TZ330; 120°Cx72h, TZ660; 150°Cx72h)

* The values in the table are typical values and not verified values.

Table 3 Compression set of NOF[®]-ALLOY TZ Series

Temperature	NOF [®] -ALLOY TZ330-7511-BK	NOF [®] -ALLOY TZ660-7612-BK
23°C	24	23
70°C	37	30
120°C	58	40
150°C	79	49
175°C	Incapable measurement	60

* ASTM D 395; 24h, 25% compression

Table 4 Molding condition

Condition		NOF [®] -ALLOY TZ330-7511-BK	NOF [®] -ALLOY TZ660-7612-BK
Drying condition		90°C, more than 4 hours	120°C, more than 4 hours
TYPE	Injection	Cylinder 170~240°C Mold 10~ 80°C	Cylinder 230~300°C Mold 10~ 80°C
	Extrusion	Cylinder 170~200°C Die 170~200°C	Cylinder 230~270°C Die 230~270°C
	Blow	Cylinder 170~200°C	

4 Application of NOF[®]-ALLOY TZ Series

NOF[®]-ALLOY TZ Series is molded by some common methods (extrude, injection, blow etc.), and it is used in Air ducts, Covers and Seals for automotive application. Especially **NOF[®]-ALLOY TZ Series** is a suitable material for packing, and gaskets of automotive and industrial application because of the excellent elasticity.

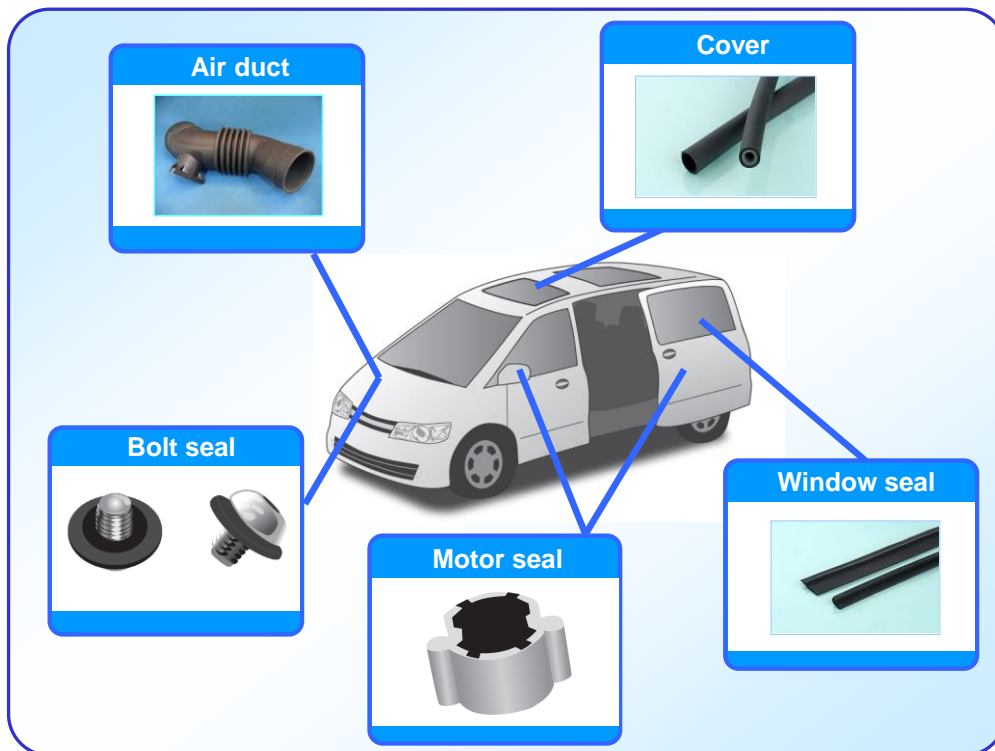


Fig.6 Application of NOF[®]-ALLOY TZ Series

5 Advantage points of NOF[®]-ALLOY TZ Series for applications

① Air duct

By integral molding of **NOF[®]-ALLOY TZ Series** with PP, the molding cost and time can be saved. Furthermore, **NOF[®]-ALLOY TZ Series** doesn't have a problem of oil leaks in the stringcourse of air duct even though other TPOs have a problem.

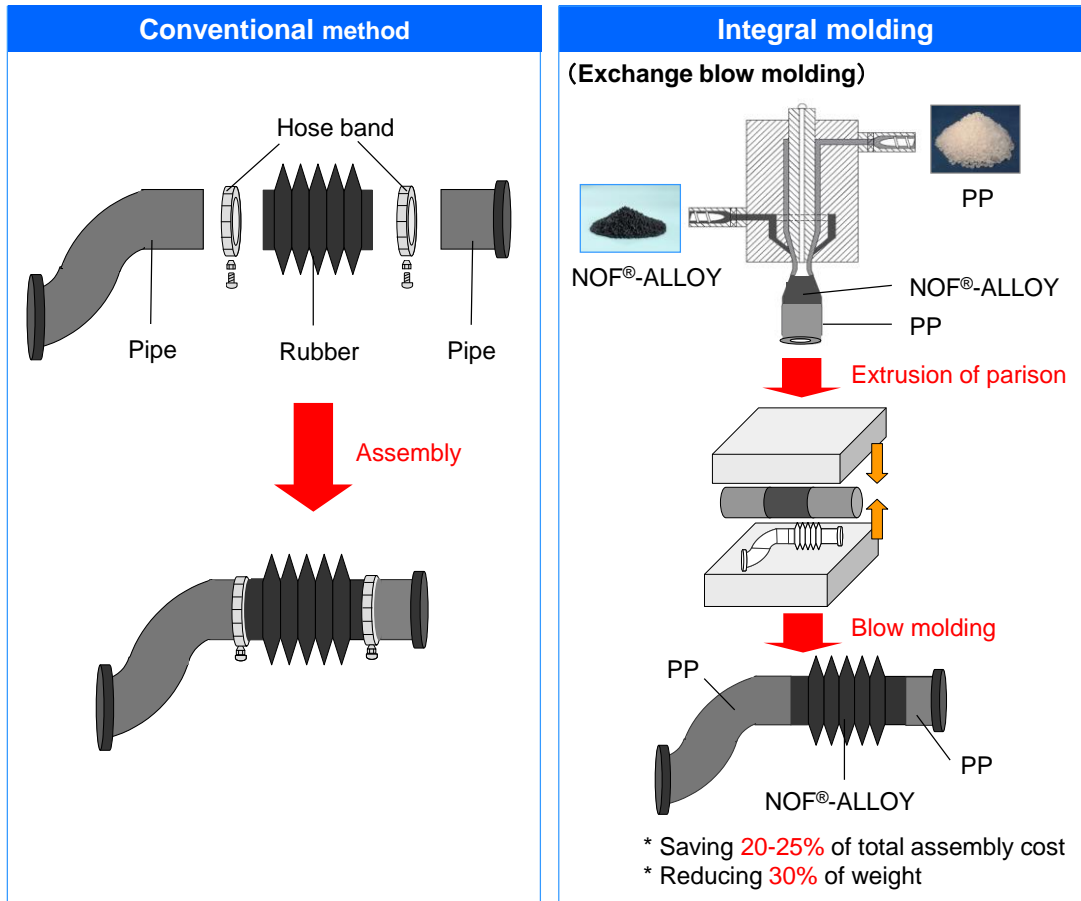


Fig.7 Cost down by integral molding with PP

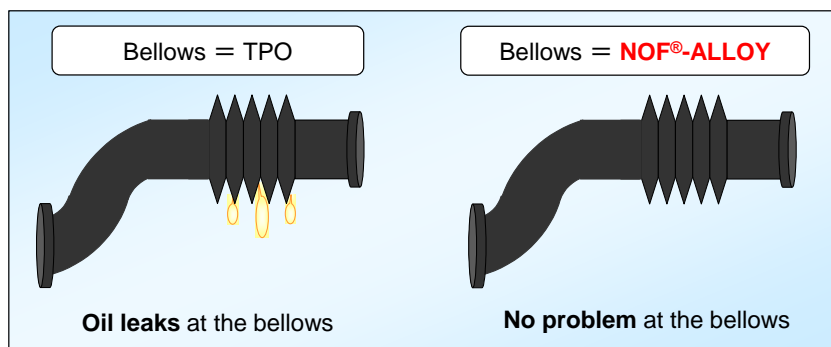


Fig.8 Advantage point of air duct made of NOF[®]-ALLOY TZ Series

<Advantage points of NOF[®]-ALLOY TZ Series>

- Saving the molding cost ; **NOF[®]-ALLOY TZ Series** saves 20-25% of molding cost compared to the conventional method.
- Flexibility of design and molding ; **NOF[®]-ALLOY TZ Series** can be molded to complex shapes.
- Excellent oil resistance ; **NOF[®]-ALLOY TZ Series** has high durability & reliability for the automotive parts.
- Light weight ; **NOF[®]-ALLOY TZ Series** can reduce approximately 30% weight compared to the conventional parts.

② Bolt sealing

By integral molding of NOF[®]-ALLOY TZ Series with bolt, the cost of bolt sealing can be saved.

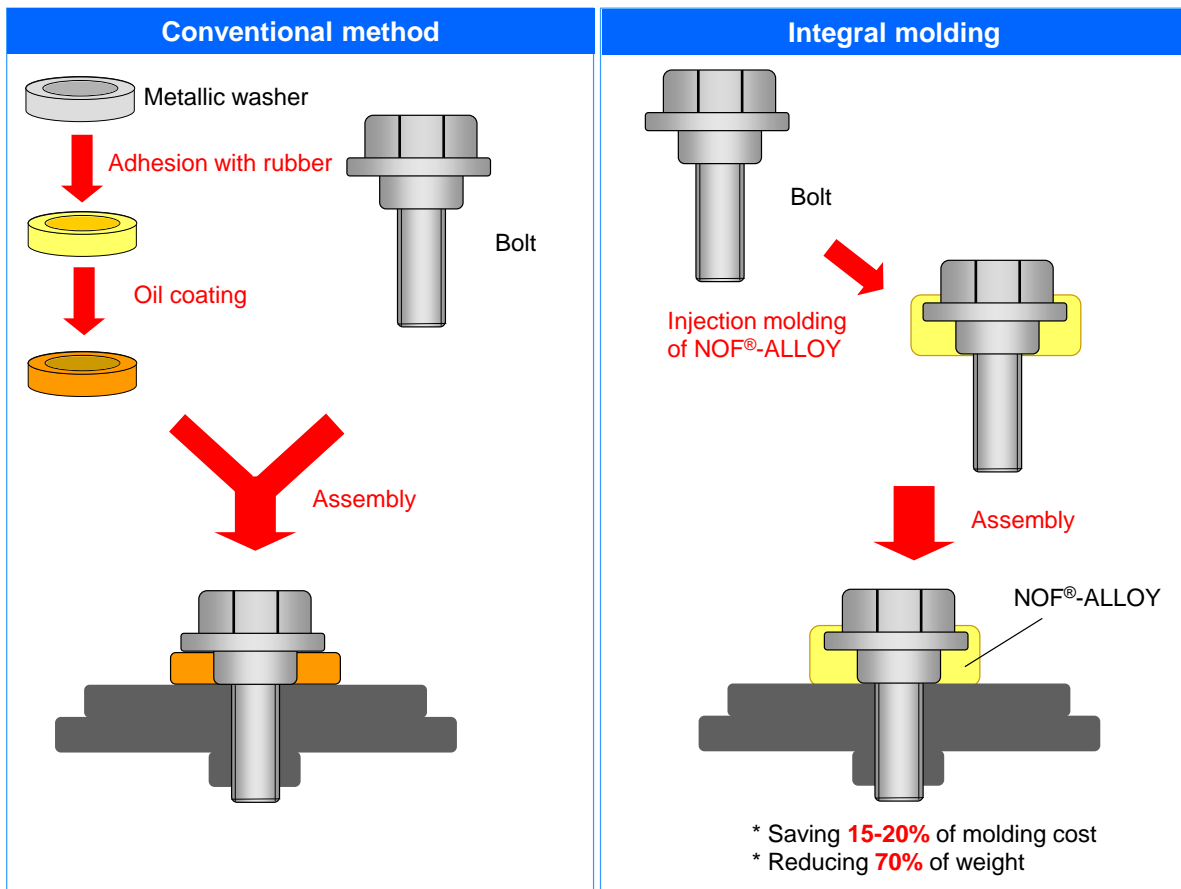


Fig.9 Cost down by the integral molding with Bolt

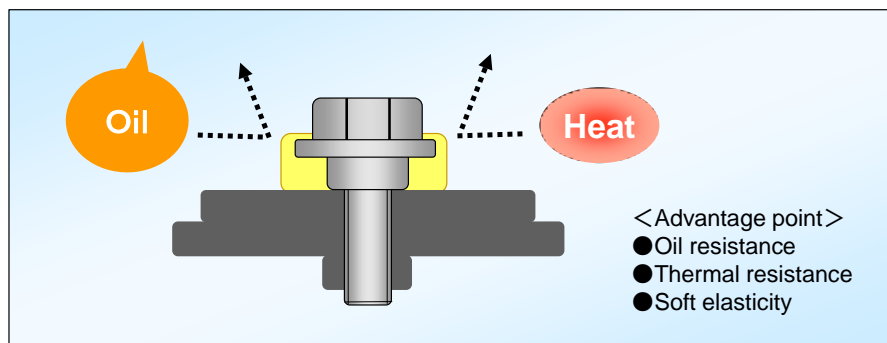


Fig.10 Advantage point of NOF[®]-ALLOY component

<Advantage points of NOF[®]-ALLOY TZ Series>

- Saving the assembly cost ; **NOF[®]-ALLOY TZ Series** can save 15 -20% of molding cost compared to the conventional method.
- Flexibility of design and molding ; **NOF[®]-ALLOY TZ Series** can be used for the complex sealing shape.
- Excellent oil resistance ; **NOF[®]-ALLOY TZ Series** has high durability & reliability for the automotive parts.
- Light weight ; **NOF[®]-ALLOY TZ Series** can reduce approximately 70% weight in comparison to the conventional parts.

6 PACKAGE

- **Shape** ; pellet
- **Color** ; black
- **Packing** ; 20kg, paper bag

7 NOTICE

Although Research Department of NOF CORPORATION has compiled the figures in this catalogue, NOF CORPORATION can not guarantee the results in independent tests.

All precautionary labels and notices should be fully read and understood by all supervisory personnel and employees before using.


For additional safety and health information, contact NOF CORPORATION.

NOF CORPORATION does not guarantee any rights while utilizing **NOF[®]-ALLOY TZ Series**.

Additionally, NOF CORPORATION would encourage your company to experiment with **NOF[®]-ALLOY TZ Series's** exceptional properties to discover your solution.

Please inquire about NOF's sampling program.

8 NOTES

 Safety Data Sheet(SDS) for USA is in preparation.

9 CONTACTS

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