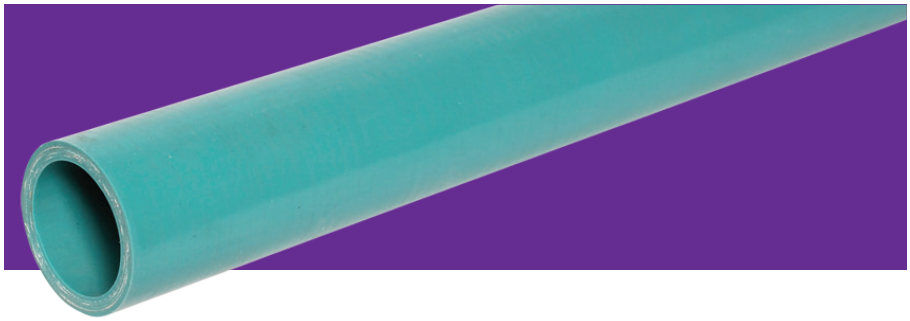
Leyland
HOSE & SILICONE

OEM SPECIALIST MANUFACTURERS OF SILICONE HOSES






Providing solutions in technical hose requirements for turbo charger coolant and heater hose applications.

V4

ISO 9001 Accredited

www.lhss.co.uk

About Us

Established in 1988 as Iddon PSV Parts Ltd, Leyland Hose and Silicone Services (LHSS) was acquired by Leyland Bus Parts Ltd in the year 2000 and has since been incorporated into the Leyland Exports Ltd group.

LHSS specialises in the design and manufacture of silicone and organic rubber hoses primarily for the bus, truck, automotive and industrial markets. It's silicone materials are designed to withstand the most demanding requirements for Euro 5 applications and beyond.

Operating highly-effective and cost-efficient manufacturing facilities, LHSS uses only the highest quality raw materials combined with the latest processing techniques.

From mixing and calendaring to the production of high-tech hoses for turbo charger, coolant, industrial and general fluid or air-handling applications.

Quality and performance

Demonstrated by our Group manufacturing facilities TS16949 approval, LHSS is commited to providing clients with a quality high-performance product supported by CAD drawing and hose design capabilities, as well as CNC tooling manufacture and in-house dynamic test equipment.

Using premium-quality silicone materials, polyester and meta-aramid fabrics, LHSS hoses are manufactured and tested to the strictest industry standards.

With the addition of fluorosilicone and fluorocarbon lining the products are capable of performing in even the most severe of service conditions.

Hoses can be designed to withstand temperatures of +250°C and resist the aggressive environment of EGR applications.

LHSS offers an extensive range of in-house materials and products test equipment including burst testing, high temperature testing, testing effect of coolants on silicone and other hose materials and dynamic test rig. This means delivering hose products designed to perform to the most demanding of customer specifications.

Silicone Coolant Hose

Silicone Coolant Hose

Leyland Hose & Silicone (LHSS) manufactured silicone hoses are designed to connect metal pipe work and components, in systems using water and ethylene glycol based coolants. Manufactured from only the highest quality silicones and reinforcement fabrics, LHSS silicone hoses are designed to operate at temperatures from - 50°C upto +180°C and at operating pressures of 2.5 - 4 bar.

LHSS silicone hoses can also be made to meet specific requirements, operating at pressures in excess of 6 bar, easily exceeding the demands of modern Euro 6 engines. Our silicone hoses offers superior reliability and out perform conventional materials such as EPDM.

Applications

LHSS silicone hoses are specifically designed for use in coolant systems on trucks, buses, passenger cars, generators, railway engines and many other vehicle and industrial applications where connections are required between rigid or flexible metal pipes. They are ideal for joining pipes of similar or differing diameters - reducers.

Available in standard sizes from 6mm to 152mm diameter, with diameters greater than 152mm made to specific customer requirements. LHSS hoses meet or exceed the requirements of SAE J20 R1 Class A. For hoses resistant to OAT (Organic acid based coolants) please see our range of OAT hoses.

Silicone Coolant Hose

Product Range

We also offer a range of single ply, extruded hose available on reels. Our standard, blue silicone hose (BSH) stock includes:

Straight hose (BSH)
6mm - 152mm ID in 1m, 2m or 3m lengths.

Straight hose (BSH)
6mm - 76mm ID in 4m lengths.

90 Degree elbows (BSH90)
6mm - 152mm ID with 102mm, 152mm or 250mm leg lengths.

45 Degree elbows (BSH45)
6mm - 152mm ID with 102mm or 152mm leg lengths.

90 Degree reducing elbows (BSH90R)
with 102mm or 152mm leg lengths.

135 Degree elbows (BSH135)
6mm - 76mm ID with 102mm or 152mm leg lengths.

U' BEND hoses (BSH180)
6mm - 76mm ID with 102mm or 152mm leg lengths.

Straight and elbow reducers (BSHR)
Straight and elbow reducers are available in a wide range of sizes. These allow connections between differing pipe diameters, providing smooth flow of coolant throughout the system.

Castellated, flexible VOR hose (CBSH)
10mm - 63mm ID.

Extruded Silicone Heater Hose (SHH)
6mm - 25mm ID.

Silicone Coolant Hose

Construction

Leyland Hose and Silicone manufacture silicone hoses to the highest standard, designed to operate under the most extreme conditions found anywhere in todays modern engines. LHSS silicone hoses, are manufactured using high quality silicone from world leading suppliers. The woven and knitted polyester fabric reinforcement used, is of the highest quality and supplied by leading UK manufacturers.

Our standard range of hoses are constructed using 3, 4 or 5 plies of fabric depending on diameter, with a minimum wall thickness of 4.5mm. Other construction options are provided according to service conditions and specific customer requirements. Our materials and specification are carefully chosen, to provide a hose which offer easy fitting combined with maximum performance.

A range of sprung, stainless steel wire or nylon cord reinforced silicone hoses are also offered. These can be used in application where a great deal of flexibility is required, high working pressures up to 30 bar are experienced or, high vacuum or suction is applied. Our range of wire reinforced hoses can be supplied as a smooth, uniform hose or, with a spiral convoluted or castellated form, providing much greater flexibility. These hoses can be used in any vehicle systems, industrial applications, wind turbines and any high or low pressure systems.

Production and Technical Options

- Part marking including specific customer logo, part numbers and traceability options.
- High temperature reflective sleeving, providing protection in specific vulnerable areas for example close to turbo or exhaust systems.
- Anti-abrasion sleeving. This can provide protection where a hose is likely to come in to contact with moving or, vibrating components.
- Hose Clamps: Leyland Hose & Silicone recommend and can provide a range of clips, ideal for all hose clamping solutions.

Custom Designed and Bespoke Hoses

Leyland Hose & Silicone have 'in-house' tool manufacturing capability. In addition, we have the support of local and other tool manufacturers.

This allows us to offer a wide range of product options from simple elbow hoses to complex shapes, bellows and large intake hoses. We also offer a design service for non-standard applications, providing full technical and 3D drawings for approval and future reference.

Testing

Our dedicated factory is equipped with an extensive range of test equipment which allows LHSS to monitor, maintain and provide materials and product to both customer and our own unique and demanding specifications.

All product used in our hose building process is supplied with customer certification. We carry out our own in-house testing to verify batch to batch consistency.

In addition, LHSS are able to carry out product testing. Our factory has the facilities to carry out burst pressure testing, heat ageing, vibration and flex testing and pressure cycle testing. Wealso test the effect of coolants on silicone and other hose materials.

At Leyland Hose and Silicone, our priority is to ensure we can offer our customers a consistent and high quality silicone hose, out-performing many other hoses offered on the market today.

Standard Blue Silicone Hose

Our modern and highly flexible manufacturing process allows our production facility to cope with a wide range of products and a diverse customer base. Leyland Hose & Silicone produce specialist one off prototypes, low volume parts and high volume production for the bus, truck and automotive markets. Having our own dedicated factory means we can focus on specific requirements and tailor our production to the ever changing needs of our customers.

1) General

Working Temperature -50°C to +180°C.
Good physical and chemical compatibility with coolant and corrosion inhibitors.
For conveyance of oil and fuel, a fluorosilicone liner is required (FSH).
Standard colour is blue but other colours are available.
All hoses to meet or exceed SAE J20R1 class A.

2) Material Specification Silicone Compound

Tested to BS903 at pressed cured for 5 minutes at +115°C.
Hardness (IHRD) 65 + 5
Density (g/cm3) 1.26 + 0.03
Tensile strength (Mpa) 7 min
Elongation at break (%) 200 min
Tear strength (KN/m) 11 min
Compression set (%) 18 Max

3) Reinforcement Fabric

Yarn: Fine Mesh 100% Polyester
Thickness: 0.56mm
Weight: 90gsm +/ - 17gsm
Burst pressure: 16Bar (232 psi) Tensile strength: 75-80 Kgf

4) Construction

Thickness of hose: 4.5mm min. silicone compound.
Layers of reinforcements:
Minimum 3 ply for diameter < 50mm
Minimum 4 ply for diameter > 50mm
Minimum 5 ply for diameter > 102mm
* Or built to customer requirement

Outside finish:

Cellulose bound (smooth finish)

5) Diameter Ranges

¼" (6mm) to 3" (76mm): 3m or 4m lengths
3-1/8" (80mm) and above: 1m lengths

Burst Pressure Chart

LHSS Burst Pressure for POSH (OAT Grade) and standard blue hoses.
Temperature rating: (-50°C) up to (+180°C)

Inner Diameter	Standard Blue Coolant Burst Presure (Bar)	Oat Resistant Hose Burst Presure (Bar)
6mm	34.0	
9.5mm	30.0 (41)	33.8 (45)
12.7mm	27.2	29.0
14mm	26.2	28.8
15mm	25.8 (29)	28.5 (33)
16mm	25.0	28.2
19mm	22.0	27.4
22mm	20.5	26.0
25.4mm	19.0 (25)	25.2 (30)
28mm	18.8	24.8
30mm	18.5	24.3
32mm	18.2	24.0
35mm	17.2	22.5
38mm	16.6	21.6
40mm	16.1	38.0
42mm	15.5	20.5
45mm	14.2	19.6
48mm	13.8	19.1
50.8mm	16.0 (18)	18.8 (21)
54mm	14.8	17.5
55mm	14.6	17.3
57mm	13.8	16.5
60mm	13.0	15.5
63mm	12.6 (16)	14.8 (19)
65mm	12.2	14.3
70mm	10.2	13.8
76mm	9.5 (14)	12.2 (17)
80mm	8.1	10.9
83mm	7.0	9.2
85mm	6.9	9.0
89mm	8.5	11.8
95mm	7.4	9.2
102mm	6.0	8.0
115mm	5.6	7.7
127mm	5.0	7.5
140mm	5.0	7.3
152mm	4.6	7.1
	Temp resistant to: 180°C	Temp resistant to: 200°C

Organic Acid Technology (OAT) Coolants and Silicone Hose

Ethylene Glycol coolants usually contain compounds such as amines, phosphates, nitrites, borates and or silicates. The mixture is far less environmentally friendly than a typical pure OAT coolant mix which usually contains non of the above.

Hybrid (HOAT) coolants are generally moderately 'silicated' for improved aluminium protection.

Ethylene glycol coolants offer rapid protection of cooling system components however, the inhibitors deplete rapidly meaning that frequent changes of coolant are needed to maintain effectiveness.

Typical coolant life can be 30-50,000 miles. Pure OAT coolants take longer to protect the metallic components in the system however, once the protective layer is laid down, the inhibitors deplete only very slowly. Coolant life is typically between 150 – 300,000 miles.

The initial cost of OAT coolants is also generally, lower than that of Ethylene Glycol coolant. Cost savings can therefore, be significant.

Hybird coolants (HOAT) offers a blend of the 2 benefits, by using a moderate level of salts such as silicates or borates.

The HOAT coolants offer rapaid protection, long life (150,000 miles) and prevent clogging of water pumps etc. Traditional ethylene glycol coolants have little or no effect on silicone hoses under normal working conditions.

PURE OAT coolants have little effect on high quality silicone material however, they can have an effect on certain types of reinforcement fabric used in the hoses.

Silicone Coolant Hose OAT Resistant

Silicone out performs conventional, organic hose materials, maintaining performance and flexibility over a wide temperature range, giving longer life and optimum reliability.

Hand built and available in a range of sizes and Shore hardness, our silicone coolant hose resists hardening, cold leakage, high and low temperatures, varying pressures and is manufactured to resist OAT coolants and aditives.

Meet or exceeds the requirements of SAE J20) R1 Class A.

Our standard, green silicone hose (OSH) stock includes:

Straight hose (OSH)
6mm - 152mm ID in 1m, 2m or 3m lengths.

90 Degree elbows (OSH90)
6mm - 152mm ID with 102mm, 152mm or 250mm leg lengths.

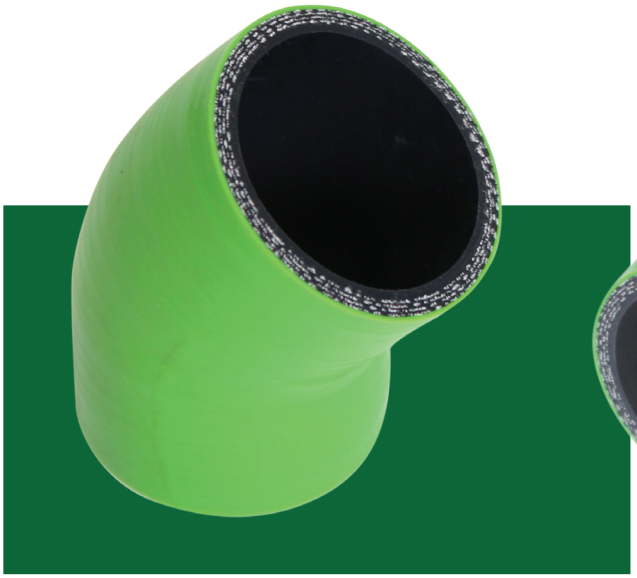
45 Degree elbows (OSH45)
6mm - 152mm ID with 102mm or 152mm leg lengths.

90 Degree reducing elbows (OSHR90)
with 102mm or 152mm leg lengths.

135 Degree elbows (OSH135)
6mm - 76mm ID with 102mm or 152mm leg lengths.

'U' BEND hoses (OSH180)
6mm - 76mm ID with 102mm or 152mm leg lengths.

Straight reducers (OSHR)
Wide range of sizes available.



Summary

LHSS - OAT Gradesilicone hose, offers an option beween EPDM, Blue Silicone Hose and Fluoro-silicone Hose, both from cost and performance aspect.

The constuction of the OAT hose eliminate some of the potential failure points of a fluro-lined and 'standard' blue silicone hose while out performing EPDM hose.

Leyland Hose & Silicone manufacture a high grade OAT resistant hose which also with stands much higher temperatures than conventional coolant hose. Our OAT grade hose will operate in the range 150°C up to +230°C, making our OAT hose suitable for use in higher, under bonnet temperatures.

Our OAT grade silicone hose, also offers typically 30% higher burst pressure than standard coolant hoses.

Silicone Turbo-charger (CAC) Hose

Silicone Turbo-charger (charge air cooler) Hoses

Manufactured from only the highest quality silicones and reinforcement fabrics, LHSS silicone hoses are designed to operate at temperatures from -50°C up to +250°C and at operating pressures up to 6 bar. Bespoke hoses can be manufactured to withstand significantly higer pressures where required.

Our silicone hoses offer superior reliability even when operating under the extreme conditions found on modern Euro 6 engines. Our air intake hoses can be manufactured to withstand the low, negative pressures experienced on many modern engine systems, while maintaining good flexibility. Our Turbo-charger and intake hoses are used by many OE vehicle manufacturers in Euro 5 and Euro 6 applications.

Our multi-directional test rig allows Leyland Hose & Silicone to prove our Turbo-charger (CAC) and intake hoses, under severe conditions at up to 230°C.

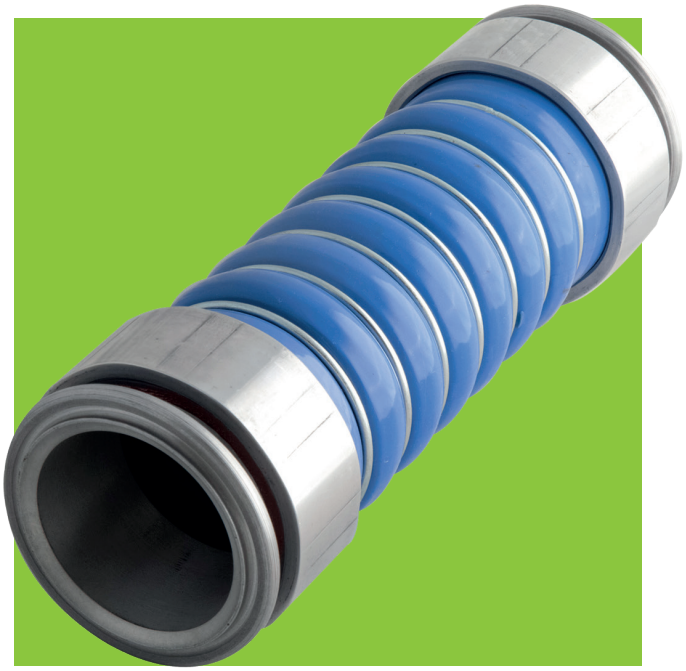
Applications

LHSS silicone hoses are specifically designed for use in the turbo-charger and intake systems on trucks, buses, passenger cars, generators, railway engines and many other vehicle and industrial applications where either rigid or flexible connec-tions where either rigid or flexible connections with high, muilti-directional movement are required.

Leyland Hose and silicone produce a wide range of straight sleeves, shaped non-convoluted hoses and convoluted hoses (bellows). Convoluted hoses are produced with both conventional cuffed ends or, with V-band connections.

V-band clamp hoses are particularly useful where space limitations restrict fitting of the hose. They are ideal for joining pipes of similar or differing diameters - reducers, turbo chargers, intercoolers and air intake systems.

LHSS manufacture charge air cooler hoses for both hot and cold-side applications. See under construction section for more details.



Silicone Turbo-charger (CAC) Hose

Product Range

Turbo-charger hoses

Straight sleeves up to 152mm diameter as standard, shaped hoses, straight convoluted hoses – with or without stainless steel rings, elbows, elbows with convolutions – with or without stainless steel rings, reducer elbows and straights.

Air Intake

Produced in a variety of complex shapes, with or without convolutions for added flexibility. Leyland Hose & Silicone produce intake hoses with multi outlets. Air sensors can be built into the hose wall. Wire reinforced hoses for high vacuum resistance are also produced.

Construction

Leyland Hose and Silicone manufacture silicone hoses to the highest standard, designed to operate under the most extreme conditions found anywhere in todays modern engines. LHSS silicone hoses are manufactured using high quality silicone from world-leading suppliers. The woven and knitted meta-aramid fabric reinforcement used, is of the highest quality, supplied by leading UK manufacturers.

Our standard range of hoses are made using 3, 4 or 5 plies of fabric depending on diameter, with wall thickness and construction dependent on service conditions and flexibility required. Our materials and specification are carefully chosen, to provide a hose which offer easy fitting combined with maximum performance.

Where a high vacuum resistance is required, for example on off highway or most modern Euro 6 standard engines, hoses can be constructed with either a wire helix built within the wall or, with internal, stainless steel springs.

Turbo-charger (CAC) Hose Material

1) General

Leyland Hose & Silicone Turbo-charger and Inter-cooler hoses, offer the highest degree of reliability under extreme under bonnet applications.

Manufactured from only the highest quality silicone and UK sourced fabrics, hoses are offered from the design stage to your complete solution for turbo and inter-cooler applications. Our constructions are thoroughly tested and proven at temperatures up to 230^{0}C on our multi-directional test rig, giving our customers confidence in the performance and reliability of Leyland Hose & Silicone CAC hoses.

2) Fuel and Oil Resistance

Where fuel or oil mist is present, normal silicone material will absorb and degrade rapidly during service. Leyland Hose & Silicone offer superior, fluoro silicone lined hoses, to resist fuel, oil and diesel. Using the highest quality fluorosilicone material as a liner, our unique manufacturing process enables us to achieve an inter ply bond strength of almost double that found when tested against several competitor hoses.

LHSS use only 100% fluorosilicone however, we remain competitive due to our efficient manufacturing process, where many competitors use 'diluted' fluorosilicone material in order to reduce cost.

2) Material Specification - Silicone Compound

Tested to BS903 at pressed cured for 5 minutes at 120°C.

Hardness (IHRD) 60 + 5
Density (g/cm3) 1.24 + 0.03
Tensile strength (Mpa) 7 min
Elongation at break (%) 200 min
Tear strength (KN/m) 12 min
Compression set (%) 18 Max

3) Reinforcement Fabric

Polyester – For 'Cold-side' hoses or, hoses where service temperature does not exceed 180^{0}C.

Weight: 190gsm +/ - 17gsm
Burst pressure: 16Bar (232 psi)
Tensile strength: 75-80 Kgf
Temperature range: -50^{0}C up to 180^{0}C

Woven or Knitted Meta-aramid – For 'Hot-side' hoses or where service temperatures reach 230^{0}C.

Temperature range: -50^{0}C up to 230^{0}C.

Woven meta-aramid gives higher stiffness and burst pressure when required. Specialist manufacturing techniques allow us to impart higher strength with good flexibility in both radial and axial directions when building convoluted turbo-charger hoses.

Silicone Turbo-charger (CAC) Hose

Production and Technical Options

- Part marking including specific customer logo, part numbers and traceability options.
- High temperature reflective sleeving, providing protection in specific vulnerable areas for example, close to turbo or exhaust systems.
- Anti-abrasion sleeving. This can provide protection where a hose is likely to come in to contact with moving or, vibrating components.
- Hose Clamps: Leyland Hose & Silicone recommend and can provide a range of clips, ideal for all hose clamping solutions.

Custom Designed and Bespoke Hoses

LHSS have 'in-house' tool manufacturing capability. In addition, we have the support of local and other tool manufacturers.

This allows us to offer a wide range of product options, from simple elbow hoses to complex shapes, bellows and large intake hoses. Leyland Hose and Silicone also offers a design service for non-standard applications, providing full technical and 3D drawings for approval and future reference.

Testing

Our dedicated factory is equipped with an extensive range of test equipment which allows LHSS to monitor, maintain and provide materials and product to both customer and our own unique and demanding specifications.

All product used in our hose building process, is supplied with customer certification. We carry out our own in-house testing to verify batch to batch consistency.

In addition, LHSS are able to carry out product testing. Our factory has the facilities to carry out burst pressure testing, heat ageing, vibration and flex testing and pressure cycle testing.

At Leyland Hose and Silicone, our priority is to ensure we can offer our customers a consistent and high quality silicone hose, out-performing many other hoses offered on the market today.

Silcell Silicone Hose: Fuel Cell and Hybrid Electric Vehicle Hose

Leyland Hose & Silicone silcell hose is designed for use in applications where high purity of the fluid being transported, is important. Silcell is also suitable for use in potable water, food and pharmaceutical applications.

Silcell, is a silicone, polyester reinforced hose, with a high grade food/pharmaceutical quality liner. The liner material contains no pigment other additives typically found in standard silicone comounds. This significantly reduces or, eliminates the risk of contamination from siloxanes, oils and catalyst bi-products, which can be an issue with standard silicone hoses.

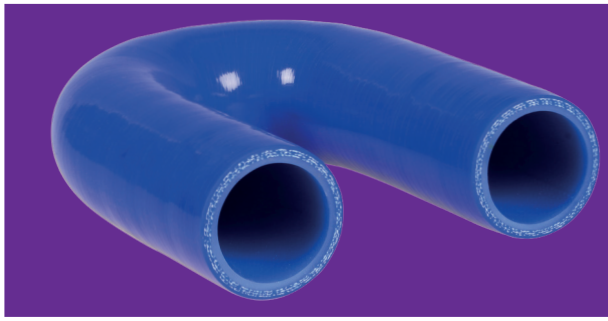
Technical details

- 3, 4 or 5 ply construction depending on inner diameter.
- 2.0mm minimum liner – hose can be any colour in the outer plies and cover
- Polyester fabric reinforcement
- Temperature range: - 55^{0}C up to + 180^{0}C
- Working pressure: 4 bar minimum. *Varies according to diameter, higher pressure is possible with smaller diameters. See separate chart for full details.
- Finished hoses cannot be used for implants.

Inner liner conforms to:

- German KTZ drinking water regulation Part 1.3.13
- Tested to USP class VI
- Food contact according to:
  German BGVV XVA and LIIA
  US-FDA-CFR21 – part 177.2600

Not recommended for use with OAT coolants or, containing 2-EHA (2-Ethylhexanoic Acid) for example, Dexcool.



Low Smoke, Low Toxicity Hose (LSLT RailSil Hose)

Silicone coolant, heater and turbo charger hoses for use where low smoke low toxicity is a requirement.

Leyland Hose and Silicone LSLT grade silicone, is specifically designed for use in MASS TRANSIT applications and other areas where fire resistance and low smoke, low toxic bi-product standards are required.
Suitable for use with all coolants including OAT. (See our separate coolant chart compatibility).

- 3, 4 or 5 ply construction depending on inner diameter.
- 2mm minimum liner.
- Colour – black, grey or brick red.
- Meta aramid reinforcement fabric.
- Temperature range: -55°C up to +250°C.
- Working pressure: 4 bar minimum. *Varies according to diameter, higher pressure is possible with smaller diameters. See separate chart for full details.

Leyland Hose and Silicone hoses are fire resistant to:

UL 94-V0 (3mm)

They also meet the following standards:

- BS6853: 1999 Cat 1a
- EN 45545-2
- NF F-16-101 Categories F1 and I2
- DIN 5510-2
- LUL 1-085 A2 Table 4

Physical Properties:

Hardness:	60 – 75 +/- 5 Shore A
Tensile strength (M/Pa):	7.0 (Min)
Elongation at break (%):	200% (Min)
Tear strength (Kn/M):	18Kn/M (Min)
Compression set 22hrs at 175°C (%):	30% (Max)

Customer options

Anti-Abrasion Sleeves

Anti-abrasion sleeves can be applied to protect against localised vibration and abrasion.

Part Marking

Part marking with Leyland, or customer logo, part number, date, etc. can be applied according to customer requirements.

Location Marking

Clamp lines or location cut outs can be added to aid installation.

Leyland Hose and Silicone manufacture a wide range of standard diameters in straight hose and 90 degree elbows. Bespoke hoses comprising shaped hoses, turbo-charger hoses and flexible spiral wire reinforced hose, can all be manufactured according to customer requirements or drawings.

We also assist in the design and specification selection for new projects and applications.

Silicone Hi Temp Glass Fabric Reinforced Hose

Leyland Hose and Silicone glass fabric reinforced silicone hoses offer the ultimate high temperature resistance. Hoses are produced using fabric made using woven glass fabric that works at temperatures in excess of 350°C. Combined with our high temperature silicone compound, our hose can work continuously at 230°C and up to 300°C intermittently.

Silicone glass reinforced hoses are not recommended for where high flexibility and movement is required.

Straight 1 mtr lengths are available from stock.

Colour – Brick Red

Material Specification – Silicone Compound

Tested to BS903 at pressed cured for 5 minutes at 120°C.

Hardness (IHRD) 60 + 5
Density (g/cm3) 1.24 + 0.03
Tensile strength (Mpa) 7 min
Elongation at break (%) 200 min
Tear strength (KN/m) 12 min
Compression set (%) 18 Max

All hoses made to SAE J20006-R3 – For use up to 180°C
For higher temperature Meta Aramid fabric used up to 260°C

Fluorosilicone and Fluorocarbon lined hoses

Fluorosilicone (FMVQ) and fluorocarbon (FKM) lined hoses for fuel, oil and chemical resistance

Where oil, oil mist, fuel and or, certain chemicals may be present in turbo-charger and other air or exhaust gas systems, it is necessary to use a fluorosilicone or fluorocarbon liner in a silicone hose. Normal silicone is not resistant to oil which, swells the silicone and permeates through wall of the hose.

A Fluorosilicone or Fluorocarbon lining can also be used to protect against OAT coolants, certain aggressive rust inhibitors sometimes used in coolant systems bi-products from EGR systems and other chemicals.

Fluorosilicone, when used with an appropriate silicone compound and fabric reinforcement, offers good temperature stability from -55^{0}C up to +230^{0}C.

Fluorocarbon lined hoses offer slightly better high temperature stability however, are not as suited to use at extreme low temperatures. Fluorocarbon is more resistant to and is required where an acidic environment is a risk, including some EGR bi-products.

Leyland Hose & Silicone offer both types of hose. When producing FVMQ and FKM lined hoses, it is vital to use only the highest quality materials. Unlike some manufacturers who dilute the lining material to reduce cost, Leyland Hose & Silicone use only 100% pure material, guaranteeing the best possible resistance to oils and chemicals.

Any dilution of the liner material, potentially reduces the performance and resistance of the hose to oils and other chemicals.

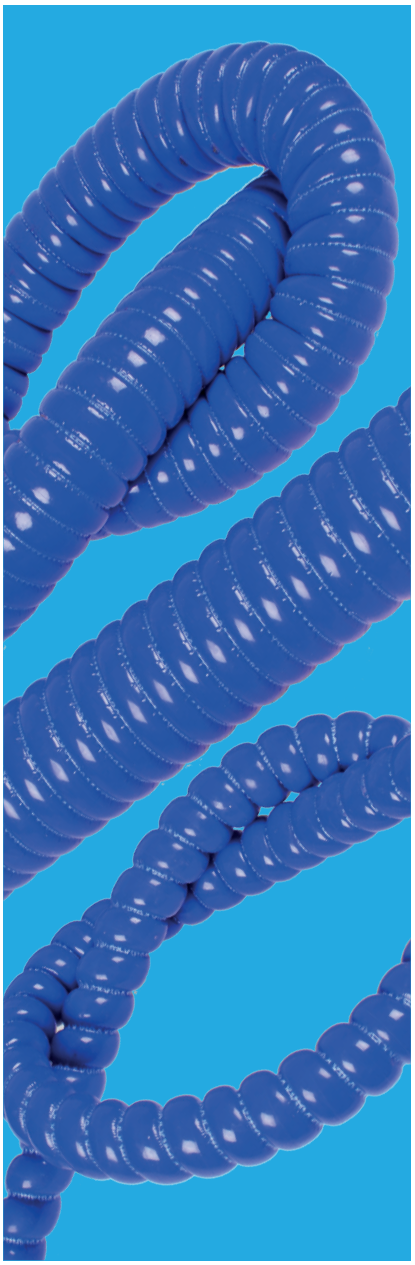
By using only the highest quality materials, LHSS silicone hoses offer superior reliability even when operating under the extreme conditions found on modern Euro 6 engines. Our Turbo-charger and intake hoses are used by many OE vehicle manufacturers in Euro 5 and Euro 6 applications.

Superflex Silicone Hoses

Superflex hoses consist of an integral silicone liner, 3 plys of polyester reinforced silicone, a 1.2mm thick galvanised steel wire helix running inside the wall of the hose and a convoluted outer.

The result is a supremely flexible hose suitable for coolant and air applications with all the advantages of silicone such as optimum performance across a temperature range of -70°C to +170°C and resistance to both positive and negative pressures. Silicone is also UV resistant and complies with SAE J20 Class A standards.

Superflex hoses can be easily fitted onto applications which may otherwise have required a shaped hose to be supplied. In this situation the Superflex hose provides a quick fix solution and eliminates tooling costs.



Our aesthetically pleasing Superflex hose is available as standard in blue and black in 1000mm lengths at the following ID's:

13mm	30mm	48mm
16mm	32mm	51mm
19mm	35mm	55mm
22mm	38mm	57mm
25mm	41mm	60mm
28mm	45mm	

*Please note that the uniqueness of the products flexibility begins to dissipate after 38mm.

Longer lengths larger, ID's and different outer colours are available. Please contact us with your requirements or any other questions you may have.

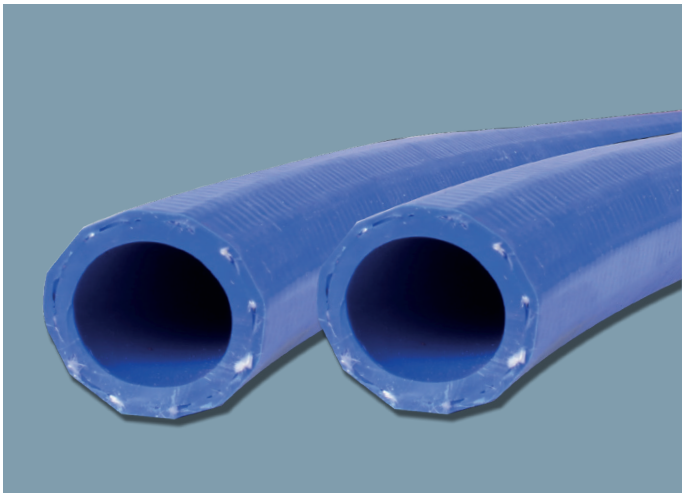
Silicone Heater Hose (Extruded)

Colour : blue outer, Blue core

Characteristics:

Continuous operating temperature -55°C to +180°C. Nylon fibre reinforced. Resistant to coolant additives. Silicone heater hose stocked on wooden reels or sold in lengths to meet the customers' requirements.

Part No.	I.D. mm	O.D. mm	Burst pressure PSI	Burst pressure pressure BARS	Spool length mtrs.
SSH/6	6	15	250	17.2	To specification
SSH/10	10	18	250	17.2	To specification
SSH/12	12	25	250	17.2	To specification
SSH/16	16	26	250	17.2	To specification
SSH/19	19	27	200	13.8	To specification
SSH/25	25	35	175	12.1	To specification
SSH/32	32	40	175	12.1	To specification



Marine Wet Exhaust Hoses

Silicone Marine and Wet Exhaust System Hoses

Leyland Hose & Silicone supply Marine and Silicone Wet Exhaust Hoses for engine and auxiliary generator sytems, used in many of todays modern, in-board engine pleasure boats. Manufactured from only the highest quality silicones and reinforcement fabrics, the are designed to operate at temperatures up to + 180^{0}C. Our 'HT' (High Temperature) Wet Exhaust and Turbo hoses, will operate at temperatures up to 210^{0}C.

They are offered in a range of straight, single hump, double hump and elbow configurations. We also offer EPDM, wire reinforced, wet exhaust hose in a range of diameters and up to 2m long. These are suitable for lower temperatures up to 130^{0}C and will operate at significantly higher positive pressures or, under negative pressure caused by suction.

Leyland Hose and Silicone Marine Wet Exhaust Hoses are tested and meet the requirements of SAE J2006 R3. Our EPDM hose meets the requirements of SAE J2006 R2.

Applications

LHSS silicone hoses are specifically designed for use in the wet exhaust systems, used on in-board marine engines and generators. Our range of silicone Wet Exhaust Hoses allow flexible connections to be made in stainless steel and other rigid pipe work. They absorb a degree of engine movement, compensate for small amounts of mis-alignment and help to reduce vibration and noise.

Product Range

Silicone straight sleeve or tubing

Straight sleeves with diameters ranging from 12.7mm up to 405mm are available, up to 2m in length. Many sizes are offered from stock.

Single hump hoses

Sizes from 50.8 up to 304.8mm Diameter, in lengths from 152mm to 306mm according to diameter.

Double hump hoses

Diameters from 101mm up to 405mm with overall lengths of 152mm to 355mm depending on diameter.

EPDM, wire re-inforced, straight hose

Available in a range of diameters and up to 2m long.

Please see our separate price list for a full range of sizes available.

Silicone Ducting Double Layer

LHSS P/No	ID mm	Coil length mtrs	Working Pressure Bar	Vacuum Pressure Bar	Bend Radius mm
SD2-13	13	4	3.00	0.74	9.50
SD2-19	19	4	3.00	0.73	12.50
SD2-22	22	4	3.00	0.72	14.00
SD2-25	25	4	2.80	0.71	17.50
SD2-32	32	4	2.70	0.65	20.00
SD2-38	38	4	2.60	0.60	24.00
SD2-41	41	4	2.60	0.59	25.50
SD2-45	45	4	2.60	0.58	27.00
SD2-51	51	4	2.60	0.52	30.50
SD2-57	57	4	2.50	0.48	33.50
SD2-63	63	4	2.40	0.46	36.50
SD2-70	70	4	2.10	0.44	40.00
SD2-76	76	4	2.10	0.43	43.00
SD2-80	80	4	2.10	0.42	45.00
SD2-83	83	4	2.10	0.41	46.50
SD2-89	89	4	2.00	0.40	49.50
SD2-95	95	4	1.90	0.37	52.50
SD2-102	102	4	1.90	0.35	56.00
SD2-115	114	4	1.50	0.30	63.00
SD2-127	127	4	1.40	0.23	69.50
SD2-140	140	4	1.30	0.20	76.00
SD2-152	152	4	1.20	0.17	82.00
SD2-178	178	4	1.00	0.12	95.00
SD2-203	203	4	0.70	0.09	107.50
SD2-254	254	4	0.50	0.07	133.00
SD2-305	305	4	0.50	0.07	158.50

Temperature Range: -70°C to +260°C and for time periods +280°C.

Smooth interior.

Spring steel wire integral in wall.

Kink-proof.

Conforms to RoSH guidelines.

Stepless® Screw Clamps
Oetiker Clamps

SELF TENSIONING SCREW CLAMPS

Choice of engagement positions: Clamp can be adjusted to several different nominal diameters
Narrow Band: Concentrated transmission of clamping force, complies with SAE J1508 Type SSPC
360⁰ Stepless®: Uniform compression, or uniform surface pressure
Burr-free strip edges: Reduced risk of damage to the part being clamped
Self-tensioning: Compensates for thermal cycle diameter changes

Part No	Description	Size Range (mm)
17800170	Stepless self tensioning screw clamp s/steel	18-24
17800172	Stepless self tensioning screw clamp s/steel	22-28
17800174	Stepless self tensioning screw clamp s/steel	26-32
17800175	Stepless self tensioning screw clamp s/steel	30-36
17800176	Stepless self tensioning screw clamp s/steel	34-40
17800177	Stepless self tensioning screw clamp s/steel	37.5-45
17800178	Stepless self tensioning screw clamp s/steel	42.5-50
17800179	Stepless self tensioning screw clamp s/steel	47.5-55
17800180	Stepless self tensioning screw clamp s/steel	49-60
17800181	Stepless self tensioning screw clamp s/steel	54-65
17800182	Stepless self tensioning screw clamp s/steel	59-70
17800183	Stepless self tensioning screw clamp s/steel	64-75
17800184	Stepless self tensioning screw clamp s/steel	69-80
17800185	Stepless self tensioning screw clamp s/steel	74-85
17800186	Stepless self tensioning screw clamp s/steel	79-90
17800187	Stepless self tensioning screw clamp s/steel	84-95
17800188	Stepless self tensioning screw clamp s/steel	89-100
17800189	Stepless self tensioning screw clamp s/steel	94-105
17800190	Stepless self tensioning screw clamp s/steel	99-110

Chemical Resistance & Coolant Guide

The following chart compares the resistance of elastomers to certain compounds (at temperatures assumed to be less than 65°C). S = Suitable for use with minimal or no attack. L = Often suitable, but with some limitations. U = Very limited, or completely unsuitable.

CHEMICAL	SILICONE (VMO)	NEOPRENE (CR)	ETHYLENE PROPYLENE (EPDM)	FLUOROSILICONE (FVMQ)	FLUOROCARBON (FKM)	NITRILE (NBR)
Acetic Acid 5%	S	S	S	S	S	L
Air	S	S	S	S	S	S
Ammonia (Liquid)	S	S	S	S	U	L
Animal Fats	L	L	L	S	S	S
ASTM Oil #1	S	S	U	S	S	S
ASTM Oil #4	U	U	U	L	S	L
Beer	S	S	S	S	S	S
Bezine	U	L	U	S	S	S
Bleach Solutions	L	U	S	L	S	L
Boric Acid	S	S	S	S	S	S
Calcium Chloride	S	S	S	S	S	S
Calcium Hypochlorite	L	L	S	L	S	L
Carbon Dioxide Dry	L	L	L	L	L	S
Carbon Dioxide Wet	L	L	L	L	L	S
Carbon Tetrachloride	U	U	U	S	S	L
Chlorine Dry	U	U	U	S	S	U
Chlorine Wet	U	U	L	L	S	U
Chloroform	U	U	U	L	S	U

CHEMICAL	SILICONE (VMO)	NEOPRENE (CR)	ETHYLENE PROPYLENE (EPDM)	FLUOROSILICONE (FVMQ)	FLUOROCARBON (FKM)	NITRILE (NBR)
Copper Salts	S	S	S	S	S	S
Diesel Oil	U	U	U	S	S	S
Ethanol	S	S	S	S	U	S
Ferric Sulfate	L	S	S	S	S	S
Freon 114	U	S	S	L	L	S
Fuel Oil	U	L	U	S	S	S
Gasoline	U	U	U	S	S	S
Glucose	S	S	S	S	S	S
JP4 (Mil-J-5624-F)	U	U	U	S	S	S
Kerosene	U	L	U	S	S	S
Lactic Acid cold	S	S	S	S	S	S
Linseed Oil	S	U	U	S	S	S
Lye Solutions	L	L	S	L	L	L
Magnesium Chloride	S	S	S	S	S	S
Methanol	S	S	S	S	U	S
Mineral Oils	L	L	U	S	S	S
Natural Gas	S	S	U	U	S	S

CHEMICAL	SILICONE (VMO)	NEOPRENE (CR)	ETHYLENE PROPYLENE (EPDM)	FLUOROSILICONE (FVMQ)	FLUOROCARBON (FKM)	NITRILE (NBR)
Olive Oil	S	L	L	S	S	S
Ozone	S	L	S	S	S	U
Perchlorelhylene	U	U	U	L	S	U
Potassium Salts	S	S	S	S	S	S
Propane	U	L	U	L	S	S
Sewage	S	L	S	S	S	S
Silicone Grease/Oils	U	S	S	S	S	S
Sodium Hypochlorite	L	U	L	L	S	L
Sulfur Chloride	U	U	U	S	S	U
Sulfuric Acid, dilute	U	U	L	U	S	U
Tannic Acid	L	L	S	S	S	S
Toluene	U	U	U	S	S	U
Trichlerethylene	U	U	U	S	S	U
Turpentine	U	U	U	S	S	S
Vinegar	S	L	S	U	S	L
Wood Alcohol	S	S	S	S	U	S
Xylene	U	U	U	S	S	U

Elastomer and Fabric Ratings

The following chart explains strengths and weaknesses of common raw materials, rating by numbers; 1-Excellent, 2-Good, 3-Fair, 4-Poor.

ELASTOMERS	TEMP RANGE °C	TENSILE	ELECT. RESITY	IMPERMEABILITY	RESILIENCE	ABRASION	TEAR	WEATHERING	OZONE	RADIATION	WATER	ACIDS	ALKALIES	GASOLINE	TASTE	ODOR	NON-STAINING	AGING AT 212 °F	AGING RM TEMP
ELASTOMER (ASTM Desig)	**LOW / HIGH**	**PHYSICAL**						**ENVIRONMENTAL RESISTANCE**							**SUBJECTIVE**			**HEAT**	
Silicone (VMO)	-70°C +315°C	2	1	4	2	4	2	1	1	2	1	3	2	4	1	1	1	1	1
Fluorosilicone (FVMO)	-50°C +230°C	2	1	4	2	3	2	1	1	2	1	2	2	1	1	1	1	1	1
Neoprene (CR)	-40°C +120°C	1	3	3	1	1	1	2	2	2	3	3	3	4	3	2	3	2	2
Hypalon (CSM)	-30°C +135°C	2	2	2	2	2	2	1	1	1	2	3	3	3	3	2	2	1	1
Nitriles (NBR)	-40°C +120°C	1	2	2	1	1	2	3	4	3	1	4	2	2	3	2	2	2	2
Vinyl (PVC)	-20°C +75°C	2	1	3	2	2	3	1	1	2	1	2	2	3	2	2	2	4	1

FABRICS	Maximum Continuous Operating Temperture °C	Acids	Alkalies	Flex and Abrasion
Fibergias	370°C	1	3	3
Polyester	175°C	2	2	1
Nylon	160°C	3	1	1
Nomex	220°C	3	2	1
Kevlar	200°C	4	1	2
Cotton	105°C	4	1	2
Teflon	200°C	1	3	3

Chemical Resistance

The following is a run-down of the basic characteristics of LHSS's general purpose, elastomers:

Silicone, VMQ, is generally resistant to oxidising chemicals, ozone, concentrated hydroiodo; but attacked by many solvents and concentrated acids.

Fluorosilicone, FVMQ, is similar to silicone, but also resistant to gasoline, aromatic solvents and chlorinated solvents. It is attacked by ketones and selected chemicals such as hydrazine.

Fluorocarbon, FKM, is resistant to all aliphatic, aromatic, and halogenated hydrocarbons, acids, vegetable and animal oils; but is attacked by ketones, low molecular weight esters and nltro containing compounds.

Neoprene, CR, is generally resistant to mild chemicals and aliphatic hydrocarbons, ozone, selected oils and solvents; but is attacked by strong oxidizing acids, esters, ketones, and chlorinated aromatic hydrocarbons.

Nitrile, NBR, is generally resistant to hydrocarbons, fats, oils, greases, hydraulic fluids, and a variety of other chemicals, — but is attacked by ketones, esters, aldehydes, aromatic hydrocarbons and nitrocarbons.

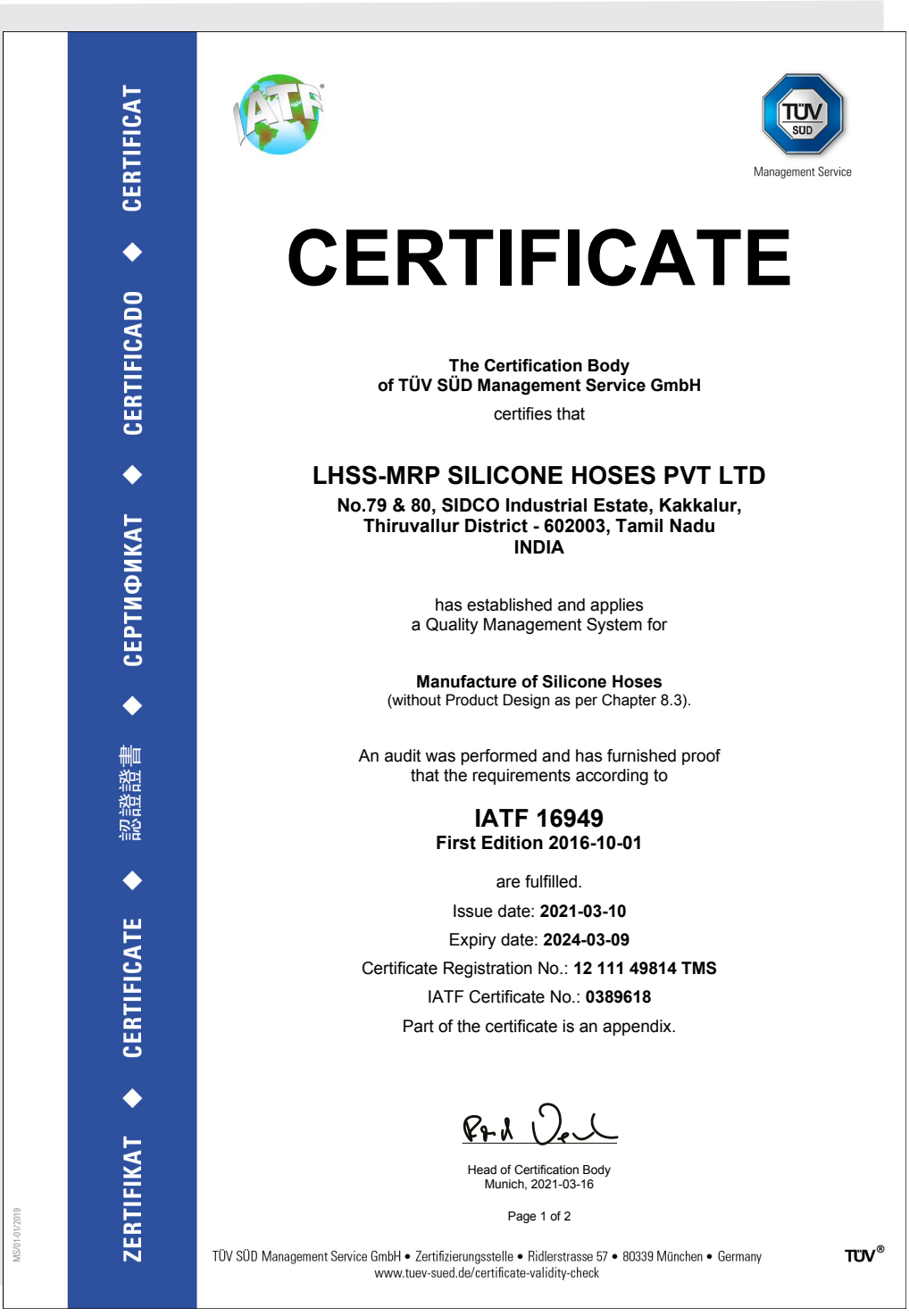
Ethylene Propylene, EPDM, Is generally resistant to animal and vegetable oils, strong oxidizing chemicals, and ozone, — but is attacked by mineral oils, solvents and aromatic hydrocarbons.

Antifreeze/ Coolant Technology Cross Reference Chart

			MARKET				
	Color	App.* A/HD	Conventional Without SCA's	Fully Formulated SCA Precharged	Hybrid Organic Acid (HOAT)	Organic Acid Extended Life (OAT)	Nitrited Organic Acid ELC (NOAT)
FINAL CHARGE ®Coolant	Red	HD				V1, POSH, V2, FSH	
FINAL CHARGE ®NOAT	Red	HD					V1, POSH, V2, FSH
FLEET CHARGE ®Coolant	Pink	HD		BSH		V1, POSH, V2, FSH	
Full Force Antifreeze	Green	A	BSH				
PEAK ®Cool	Orange	A				V1, POSH, V2, FSH	
PEAK ®Global LifeTime Antifreeze	Amber	A				V1, POSH, V2, FSH	
PEAK ®Long Life Antifreeze	Yellow	A				V1, POSH, V2, FSH	
Chevron Supreme	Green	A	BSH				
Cummins Fleetguard Heavy Duty	Green	A	BSH				
PEAK ®Antifreeze & Coolant	Green	A	BSH				
Prestone All Makes All Models Extended Life	Yellow	A				V1, POSH, V2, FSH	
Prestone Dex Cool	Orange	A				V1, POSH, V2, FSH	
Shell Dex Cool	Orange	A				V1, POSH, V2, FSH	
Shell Zone	Green	A	BSH				
Texaco Antifreeze Coolant	Green	A	BSH				
Texaco Halveline Dex Cool	Orange	A				V1, POSH, V2, FSH	
Valvoline Zerex Dex Cool	Orange	A				V1, POSH, V2, FSH	
Valvoline Zerex G-05 Coolant	Yellow	A			V1, POSH, V2, FSH		
Valvoline Zerex Original Formula	Green	A	BSH				
Volvo	Green	A			V1, POSH, V2, FSH		
Alliance Primecool GP C-40	Violet	HD				V1, POSH, V2,	
Alliance SCA Precharged Coolant	Pink	HD		BSH			
Alpine C40	Purple	HD				V1, POSH, V2, FSH	
Antifreeze ANF KK40	Red	HD				V1, POSH, V2, FSH	
Avia Antifreeze NG	Purple	HD				V1, POSH, V2, FSH	
Calfrost Extended Life Coolant	Orange	HD				V1, POSH, V2, FSH	
Calguards HD48	Blue	HD				TBC	
Castrol Heavy Duty Antifreeze with SCA	Pink	HD		BSH			
Castrol Heavy Duty Extended Life	Red	HD					V1, POSH, V2, FSH
Castrol Radicool Si OAT	Red	HD				POSH, V2, FSH	
CAT Diesel Engine Antifreeze/Coolant (DEAC)	Pink	HD		BSH			
CAT Extended Life Coolant	Red	HD					V1, POSH, V2, FSH
Chevron Delo Extended Life Coolant	Red	HD					V1, POSH, V2, FSH
Chevron Delo Extended Life NF	Yellow	HD				V1, POSH, V2, FSH	
Chevron Heavy Duty Coolant	Purple	HD		BSH			
CLASSIC KOLDA UE G40						POSH, V2, FSH	
Cummins Fleetguard ES Compleat	Blue	HD			V1, POSH, V2, FSH		
Cummins Fleetguard ES Compleat OAT	Red	HD				V1, POSH, V2, FSH	
Cummins Fleetguard Fleet Cool	Green	HD		BSH			
Cummins Fleetguard Fleet Cool	Pink	HD			V1, POSH, V2, FSH		
Detroit Diesel Power Cool Coolant	Pink	HD		BSH			
Detroit Diesel Power Cool Plus Coolant	Red	HD				POSH, HOSH, FSH	
Evans Heavy Duty	Brown	HD				BSH, POSH, FSH	
EVO ST40	Red/Violet	HD				V2, FSH	
Fuchs MAINTAIN FRICOFIN	Orange	HD				V1, POSH, V2,	
Glysantin G40	Red/Violet	HD			V2, FSH		
John Deere Cool-Gard Coolant	Green	HD			POSH, V2, FSH		
John Deere Cool-Gard II	Amber	HD				POSH, V2, FSH	
Komatsu Super Coolant AF-NAC	Blue	HD				POSH, V2, FSH	
Lukoil Coolant SOT	Red/Violet	HD				V2, FSH	
MAN 324 Type Si OAT	Pink	HD				POSH, V2, FSH	
Mercedes MB 325.5	Red	HD				POSH, V2, FSH	
Mofin Kuhlerfrostschultz M40 extra	Violet	HD				V2, FSH	
MOTOREX COOLANT M4.0	Orange	HD				V2, FSH	
Neste Coolant Longlife M	Violet	HD				V2, FSH	
Pakelo Coolant G40 Hybrid	Pink	HD				V2, FSH	
PANOLIN ANTI FROST MT 650	Blue	HD				V2, FSH	
PETRONAS ANTIFREEZE HT	Yellow	HD				V2, FSH	
Polyston G40	Red	HD				V2, FSH	
Prestone Heavy Duty Coolant	Green	HD		BSH			
Prestone Heavy Duty Extended Life	Red	HD					POSH, V2, FSH
Shell Diesel Ready Coolant	Purple	HD		BSH			
Shell Rotella Extended Life Coolant	Red	HD					POSH, V2, FSH
Shell Rotella Ultra Extended Life Coolant	Yellow	HD				POSH, V2, FSH	
Texaco Extended Life Coolant	Red	HD					POSH, V2, FSH
Texaco Heavy Duty Coolant	Purple	HD		BSH			
Texaco Havoline XLC	Orange	HD				V1, POSH, V2, FSH	
Valvoline Zerex Extended Life Coolant	Red	HD			POSH, V2, FSH		
Valvoline Zerex G-05 Coolant	Yellow	HD			POSH, V2, FSH		
Volvo VCS	Yellow	HD				POSH, V2, FSH	
XTAR Super Coolant Si OAT	Pink	HD				POSH, V2, FSH	
Comma Xstream G30	Violet	HD				POSH, V2, FSH	
EXLC5 Extended Life	Yellow	HD				BSH, POSH, V2, FSH	
SiXLC6-50	Pink	HD				POSH, V2, FSH	

* App: Primary application.
A = Automotive. HD = Heavy Duty. BSH = Silicone hose polyester reinforced. FSH = Silicone hose fluoro lined.
POSH = OAT compatible silicone hose 2014.
V1 = OAT Compatible Hose OSH 2009. V2 = OAT compatible silicone hose V2 2016.

Quality Management



ZERTIFIKAT ◆ CERTIFICATE ◆ 認證證書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

Management Service

CERTIFICATE

The Certification Body
of TÜV SÜD Management Service GmbH

certifies that

LHSS-MRP SILICONE HOSES PVT LTD

No.79 & 80, SIDCO Industrial Estate, Kakkalur,
Thiruvallur District - 602003, Tamil Nadu
INDIA

has established and applies
a Quality Management System for

Manufacture of Silicone Hoses
(without Product Design as per Chapter 8.3).

An audit was performed and has furnished proof
that the requirements according to

IATF 16949
First Edition 2016-10-01

are fulfilled.

Issue date: **2021-03-10**

Expiry date: **2024-03-09**

Certificate Registration No.: **12 111 49814 TMS**

IATF Certificate No.: **0389618**

Part of the certificate is an appendix.

Head of Certification Body
Munich, 2021-03-16

Page 1 of 2

TÜV SÜD Management Service GmbH • Zertifizierungsstelle • Ridlerstrasse 57 • 80339 München • Germany
www.tuev-sued.de/certificate-validity-check

MS01-01/2019

Quality Management

Centre for Assessment

Certificate of Registration

Leyland Bus Parts Limited t/a Leyland Hose & Silicone Services

Unit 3
Centurion Court
Leyland
Lancashire
PR25 3UQ

BS EN ISO 9001:2015

Centre for Assessment Ltd confirms that this organisation has been audited and the requirements for registration have been met for the following scope:

Supply, design, assembly and distribution of hose and silicone products

Certificate Number: 20/0471

Date of Initial Certification: 18th February 2021

Date of Expiry: 18th February 2024

Date of Issue: 18th February 2021

Revision: 0

Signed: JBullimore

On behalf of Centre for Assessment Ltd

UKAS MANAGEMENT SYSTEMS 0120

This certificate remains the property of the Centre for Assessment and may be withdrawn without notice and is valid based on the above named organisation ensuring continued commitment to compliance against the harmonised standards as defined and or associated.

Centre for Assessment Limited, Lee House, 90 Great Bridgewater Street, Manchester, M1 5JW
Web: www.centreforassessment.co.uk Tel: 0161 237 4080
Rev 1

Quality Management

Executive Summary

Objective

To assess the results of tests performed in accordance with methods T01, T10.03 and T12 as defined in EN 45545-2: 2013+A1:2015 at an irradiance level of 25kW/m^2 with a pilot flame, on specimens of a product and to provide an opinion of compliance with the requirements, as defined in EN 45545-2: 2013+A1:2015.

Generic Description	Product reference	Thickness	Density
Flame retardant grade silicone	"LHSS-LSLT Grey"	6mm	1.25 – 1.4g/cm^3
Please see page 5 of this test report for the full description of the product tested			

Test Sponsor

Leyland Hose & Silicone Services, Unit 3 Centurion Court, Leyland, Lancashire PR25 3UQ

Opinion

We consider the results of the tests confirmed in reports referenced 438689, 438690 & 438691 to the test methods detailed above demonstrate that the product, as tested, complies with requirements R22 (detailed in Table 5 of EN 45545-2: 2013+A1:2015) for a HL1, HL2 and HL3 Hazard Level Classification.

We consider the results of the tests confirmed in reports referenced 438689, 438690 & 438691 to the test methods detailed above demonstrate that the product, as tested, complies with requirements R23 (detailed in Table 5 of EN 45545-2: 2013+A1:2015) for a HL1, HL2 and HL3 Hazard Level Classification.

Signatories

Responsible Officer
K. Deluce *
Testing Officer

Authorised
J. Lucas-Cox *
Operations Manager

* For and on behalf of Warringtonfire.

Report Issued: 9th April 2021

OEM SPECIALIST MANUFACTURERS OF SILICONE HOSES

Leyland Hose & Silicone Services: Unit 3, Centurion Court, Centurion Way Leyland, PR25 3UQ
T: +44 (0)1772 642478 F: +44(0)1772 642479 E: info@lhss.co.uk

Providing solutions in technical hose requirements for turbo charger coolant and heater hose applications.

ISO 9001 Accredited

www.lhss.co.uk