SERVICE BULLETIN No.P1107

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COACH MODEL	**:** All
BULLETIN TYPE	**:** Service Information
MANUAL & SECTION	**:** Maintenance Manual: Chapter 6 – Air system Spare Parts Manual 1050A: Section 673809
PARTS BOOK REVISION	**:** No
DATE	**:** June 18th, 2002
SUBJECT	**: Air lines**
TERMS & CONDITIONS	**:** No claims will be accepted with reference to this Bulletin.

APPLICATION:

The service information subject of this Bulletin is applicable to all Van Hool units.

DESCRIPTION:

The primary purpose of this Bulletin is to acquaint service personnel with the air system tubing used on Van Hool coaches. The basic text approaches this subject in a practical manner and includes some assembly tips and reference charts..

Service personnel: please read, initial and circulate.

Service Manager	Parts Manager	Warranty Administrator	Workshop Foreman	Service Technician

AIR SYSTEM TUBING:

1. Materials:

The choice of tube material depends on design requirements such as operating temperatures, flow rate, location on the coach, susceptibility to vibrations and heat, flexible or non-flexible installation and the rated pressure. A pressure safety factor between three and five to one needs to be respected (material three to five times stronger than the anticipated working pressure). It is therefore obvious that damaged tubes must always be replaced by tubing of the same material and with the same dimensions, provided the rated pressure remains the same. Polyamide, polyethylene and nylon are three of the materials used in the construction of non-metallic tubing. They will be referred to as “plastic tubing” henceforth. Soft and semi-rigid plastic tubing has the advantage of flexibility, resistance to corrosion, and work hardening. It will not, however, stand high pressures and excess heat. It can be used for fuel, vacuum, compressed air and some lubrication lines. Special inserts are needed to attach it to conventional tube fittings. When replacing an air line, use plastic tubing only where it has been used previously.
Some semi-rigid plastic tubing has been approved by the U.S. Department Of Transportation (DOT) for brake system applications. This type of tubing is also used for the suspension system, the fuel system, and for some peripheral equipment.
Plastic tubing comes as coils in metric and inch sizes. The chart below shows some typical (metric) examples.

Metric tube size (O.D. x wall thickness) in mm	Max operating Pressure at 20°C/68°F In bar/psi	Burst pressure In bar/psi
6 x 1	27/392	81/1176
8 x 1	19/276	57/828
10 x 1	15/218	45/654
12 x 1.5	19/276	57/828
15 x 1.5	15/218	45/654
18 x 2	17/247	51/741

2. Handling:

When removing tubing from a roll, place the roll on a clean bench in an upright position. Hold the free end of the tube with one hand while rotating the roll over the bench with the other. Never lay the coil flat and pull the tubing upwards as it will be twisted. Avoid bending the tubing more than necessary. Store tubing where no heavy tools or parts are liable to cause damage. Keep the open end taped to prevent the entry of foreign material.

3. Cutting:

When cutting tubing, it is important to produce a square-end, free of any burrs, either on the outside or inside. Plastic tubing should be cut with purpose-made cutting pliers, never with ordinary cutting pliers or a hacksaw (see Figures 1 and 2).

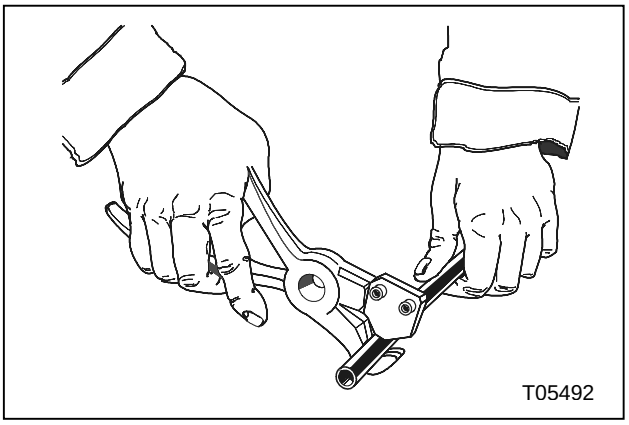

Figure 1: Cutting pliers for semirigid plastic tubing

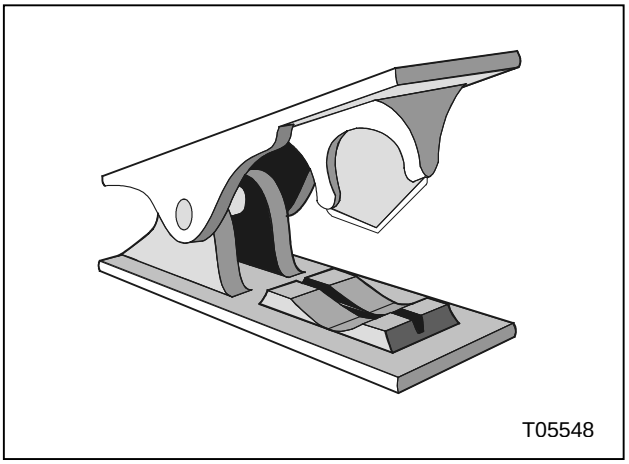

Figure 2: Cutter for soft plastic tubing

4. <u>Bending</u>:

Plastic tubing can be bent cold, but attention should be paid to the bend radius indicated in figure 3. Since the tubing has a tendency to straighten, it should be secured with supporting clamps or tie wraps before and after each bend.

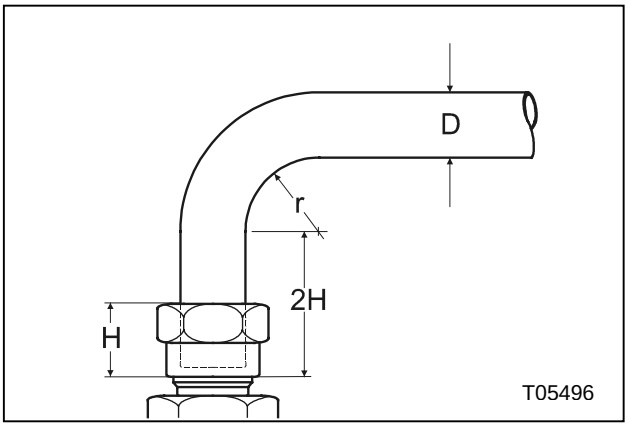

Figure 3: Plastic tubing bend radius

To avoid kinking of the tubing, keep to the minimum bending radius which should equal at least five times the tube diameter.

Some typical bend radii are shown in the chart on next page.

Tube size (O.D. x wall thickness) in mm	Minimum bending Radius r In mm/inch
6 x 1	30 / 1-3/16
8 x 1	40 / 1-9/16
10 x 1	60 / 2-3/8
12 x 1.5	60 / 2-3/8
15 x 1.5	90 / 3-35/64
18 x 2	100 / 3-15/16

5. Markings:

- Van Hool brake and suspension systems use black air lines. They are marked with colored tracers to facilitate installation at the factory and for ease of service. The colored tracer(s) may be accompanied by the line reference number, which is used on the drawings in the pneumatic diagram booklet that comes with the coach (eg. line GS-1 carries a gray tracer and is the control line for kneeling on the right hand side).
  Refer to the chart further in this Bulletin for color-coding.
- Brake airlines are marked “Air Brake SAE J844” and “DOT”. Tube sizes are in inches and the tubing outside diameter is printed on the tubing exterior. Use only this type of tubing for air brake systems.
- Suspension tubing is marked “DIN 74324”. Tube size is in mm and dimensions are printed on the tubing exterior. Example: outside diameter (O.D.) and wall thickness (10x1 mm).
- Accessory tubing may have various colors and carries the Van Hool brand name and part number.

6. Assembly instructions for SAE fittings (see Figure 4):

1) Cut off tubing to length squarely with a tube cutter. Any burrs, either on the outside or inside must be removed.

2) Slide the nut, followed by the sleeve, on the tubing. Place the special insert in the end so the sleeve will not crush the tube. When the tube is aligned with the fitting, insert the tubing, until it bottoms on the seat.

3) While holding the tubing in, run up the nut finger-tight. Using a tubing wrench, bring the nut up until the sleeve just grabs the tubing.

4) To tighten, give the nut the additional turns indicated in the table below, while holding the tubing in the fitting.

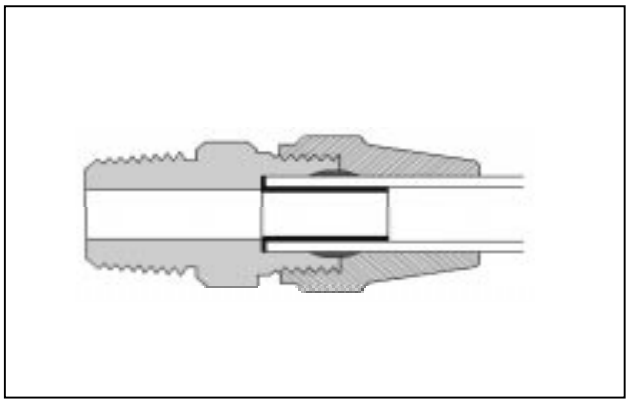

Figure 4: Assembled SAE fitting with tube, sleeve and insert

NOTE:

- *Always use the right-size wrench. It must fit the hex securely. A loose fitting wrench will round off the corners and slip.*
- *When possible, pull on the wrench. Then if the wrench slips, you are less likely to hurt your hand.*
- *Never use a steel bar or pipe to increase the length of a wrench for leverage.*
- *When tightening fittings, always support one portion with one wrench, while tightening with another.*

Tube O.D. Fractional inch	T.F.F.T. *
1/ 4	3
3/8 and 1/2	4
5/8 and 3/4	3.5

* Additional number of turns from finger-tight

NOTE: The foregoing tightening procedure applies to new compression fittings only. When assembling used (preset) fittings, bring up the nut firmly without additional turns.

7. Assembly instructions for bead forming fittings:

Bead-forming fittings can be assembled finger-tight, when used with soft plastic tubing, e.g. polyurethane, polyethylene etc. This facilitates rapid assembly and disassembly.

1) Cut the tubing squarely, using the tube cutter from Figure 2.

2) Begin assembling by inserting the tube through the nut (see Figure 5).

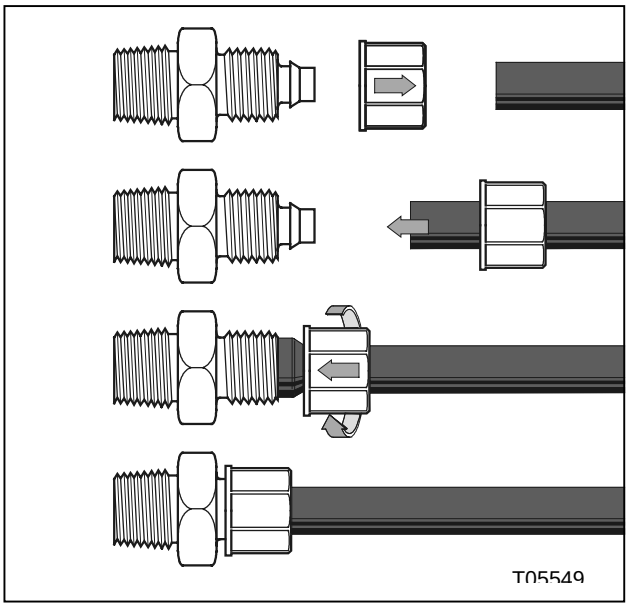

Figure 5: Assembling bead-forming fittings

3) Push the tube over the spigot of the fitting, until it contacts the stop.

4) Finger-tighten the nut to the end stop when using soft tubing. Tighten the nut with a wrench to the end stop, when using semi-rigid tubing.

8. <u>Assembly instructions for push-in fittings</u>:

1) Cut the plastic tubing squarely, using the tube cutter shown in Figure 2.

2) Insert the end of the tubing, until it bottoms in the fitting (see Figure 6).

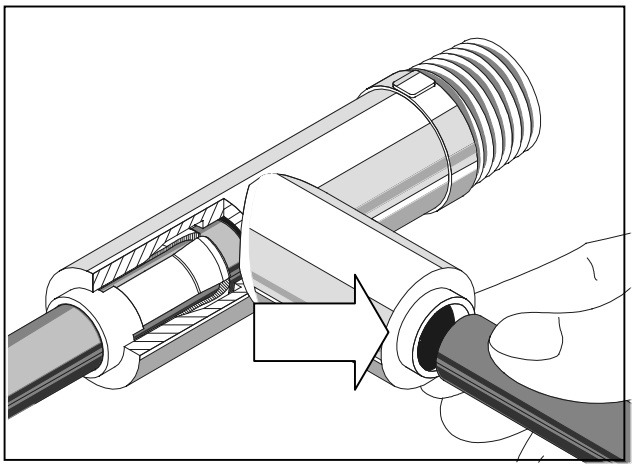

Figure 6: Assembling push-in fittings

3) Depressing the release button (see arrow) allows the tubing to be removed.

<u>PARTS</u>:

Part No.	Description	Qty.
VH 660516004	Plastic tube, black, 1/4 inch	#
VH 634201870	Plastic tube, black, 3/8 inch	#
VH 634201880	Plastic tube, black, ½ inch	#
VH 660516005	Plastic tube, black, 5/8 inch	#
VH 660515903	Plastic tube, black, 4 mm x 1 mm	#
VH 660515907	Plastic tube, black, 6 mm x 1 mm	#
VH 660516002	Plastic tube, black, 8 mm x 1 mm	#
VH 660516106	Plastic tube, black, 10 mm x 1 mm	#
VH 660516207	Plastic tube, black, 12 mm x 1.5 mm	#
VH 660516202	Plastic tube, black, 15 mm x 1.5 mm	#
VH 660516107	Plastic tube, black, 18 mm x 2 mm	#
VH 660515910	Plastic tube, red, 4 mm x 1 mm	#
VH 660515913	Plastic tube, red, 6 mm x 1 mm	#
VH 660516006	Plastic tube, red, 8 mm x 1 mm	#
VH 660515909	Plastic tube, white, 4 mm x 1 mm	#
VH 660515906	Plastic tube, white, 6 mm x 1 mm	#
VH 660516003	Plastic tube, white, 8 mm x 1 mm	#
VH 660515912	Plastic tube, blue, 6 mm x 1 mm	#
VH 660516009	Plastic tube, blue, 8 mm x 1 mm	#
VH 660515914	Plastic tube, green, 6 mm x 1 mm	#
VH 660516007	Plastic tube, green, 8 mm x 1 mm	#
VH 660515915	Plastic tube, yellow, 6 mm x 1 mm	#
VH 660515921	Plastic tube, grey, 6 mm x 1 mm	#
VH 660515919	Plastic tube, brown, 6 mm x 1 mm	#

- Parts may be purchased from your nearest ABC Companies Parts Source dealer.
- Parts disposition: discard according to applicable local environmental regulations.

SERVICE INFORMATION:

Service Bulletins are issued to supplement or supersede information in the Van Hool manuals. Note Service Bulletin number, date and subject on the register at the end of the relevant chapter(s). File Service Bulletin separately for future reference.

QUICK-REFERENCE CHARTS FOR AIR LINES:

APPLICATION:

System	Tube Size	Standard	DOT seal	Reinforced	Tube color	Colored Tracers	Fittings
Suspension	Metric	DIN 74324	No	No	Black	Yes	Compression, steel, brass
Brakes	Inch	SAE J844	Yes	Yes, Air Brake	Black	Yes	Compression, brass
Accessories	Metric	DIN 74324	No	No	Various	No	Various

VAN HOOL AIR LINE MARKERS (colored tracers on black plastic tubing):

Color code*	No. of tapes	Diagram lettering	Air subsystem
Red	1+1	R-R	Main air supply
Red/Green	1+1	R-GN	Front axle service brakes: reservoir pressure
Green	1	GN	Front axle service brakes: brake pressure
Red/Yellow	1+1	R-GE	Drive axle service brakes: reservoir pressure
Yellow	1	GE	Drive axle service brakes: brake pressure
Red/Violet	1+1	R-V	Tag axle service brakes: reservoir pressure
Violet	1	V	Tag axle service brakes: brake pressure
Red/White	1+1	R-W	Parking brake: reservoir pressure
White	1	W	Parking brake hold off supply
Brown	1	BR	Door interlock control line
Red/Grey	1+1	R-GS	Auxiliary reservoir pressure
Grey	1	GS	Air suspension/door operation
Red/Blue	1+1	R-B	Parking brake emergency release: reservoir pressure
Blue	1	B	Parking brake emergency release feed line
Orange	1	O	Venting line

* Color code may be accompanied by the air line reference number, which is used on the drawings in the pneumatic diagram booklet that comes with the coach.

TUBE, SLEEVE AND INSERT SIZES:

Plastic tube Ø	Part No.	Insert Ø	Part No.	Sleeve Ø	Part No.
1/4 inch	VH 660516004	5/32 inch	VH 637308800	1/4 inch	VH 660555503
3/8 inch	VH 634201870	15/64 inch	VH 637309520	3/8 inch	VH 660555504
1/2 inch	VH 631201880	25/64 inch	VH 637308950	1/2 inch	VH 660555508
5/8 inch	VH 660516005	7/16 inch	VH 637309910	5/8 inch	VH 637309490
6x1 mm	VH 660515907	4 mm	VH 637307010	6 mm	VH 637309990
8x1 mm	VH 660516002	6 mm	VH 637307020	8 mm	VH 637310000
10x1 mm	VH 660516106	8 mm	VH 637307030	10 mm	VH 637309270
12x1.5 mm	VH 660516207	10 mm	VH 637311720	12 mm	VH 637315500

DIN AIR VALVE MARKINGS:

0 : suction port
1 : supply port
2 : discharge port
3 : venting port
4 : control port
7 : frost protection
8 : lubrication port
9 : anti-freeze port
11 : entry first circuit
12 : entry second circuit
21 : exit first circuit
22 : exit second circuit