

Aviation hose and Accessories

Aviation Fueling Hose

EI 1529, Type C, CT, and E, Grade 2

ISO 1825, Type C and E, Grade 2

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Aviation Fueling hose and hose assemblies are more than just another rubber transfer hose

They are a highly tested and quality controlled hose.

Two styles of hose are manufactured.

Mandrel built and Extruded

Both Styles go through a variety of tests during the whole process.

Every hose assembly is 100 percent tested to 600 psi proof pressure and electrical continuity before it leaves the factory. Each assembly receives its own serial number and certificate.



EI1529 – Approval and Production Testing

Property	Type approval test	Production acceptance tests		Per hose
		per lots*	per 10 lots*	
Component tests				
Tensile strength of tube and cover	X	X		
Minimum elongation of tube and cover	X	X		
Volume increase	X	X		
Fuel-soluble matter	X		X	
Abrasion resistance	X		X	
Resistance to ageing	X		X	
Cold embrittlement	X		X	
Hose tests				
Tolerance on inside diameter	X	X		
Hose length	X	X		X
Measurement of mass per unit length	X		X	
Proof pressure	X			X
Burst pressure	X	X		

EI1529 – Approval and Production Testing

Property	Type approval test	Production acceptance tests		Per hose
		per lots*	per 10 lots*	
Adhesion (after contact with fuel)	X	X		
Adhesion (dry)	X	X		
Vacuum resistance	X	X		
Flexibility at 20 °C (68 °F) (all hoses)	X		X	
Flexibility at -30 °C (-22 °F) (all hoses except CT)	X		X	
Flexibility at -40 °C (-40 °F) (CT only)	X		X	
Electrical resistance	X			X
Kink resistance	X		X	
Fuel contamination	X		X	
Fuel discolouration	X		X	
Ozone resistance	X		X	

EI1529 – Approval and Production Testing

Concentricity	X			X
Thickness of tube and cover	X			X
Security of coupling attachment	X		X	
Coupling assembly pressure specifications	X		X	
Flammability	X		X	

Note: A minimum of three production hose samples shall be tested to ensure the quality of the production hose does not vary from the hose tested during the first article testing. Samples shall be chosen at the convenience of the manufacturer but shall be representative of each 500 m (1 641 feet) of production ± 10 m (33 feet).

* A lot is either 500 m (1 641 feet) of hose or 500 kg (1 103 pounds) of lining and cover compound.

Aviation Type C Fueling Hose - It's not the bend radius that is important, it's the REELING DIAMETER per EI 1540

Table 4: Minimum recommended diameter of hose reels

Nominal internal hose diameter		Minimum external diameter of reeling drum used in service	
mm	inches	mm	inches
19	0,75	225	8,86
25	1	300	11,8
32	1,25	375	14,6
38	1,5	450	17,7
50	2	550	21,6
63	2,5	600	23,5
75	3	600	23,5
90	3,5	900	35,4
100	4	900	35,4

Proper Installation of a hose is extremely important

Take the stress off of the fittings. Both at rest and during the complete move of the hose.

Follow the natural curve of the hose.

No twists and keep to a single plane.

Use swivels, if the fitting will be stressed.

This appears to be ok. But the transition off the fitting is not straight and the immediate curve of the hose is stressing the fitting



Basic routing rules for flexible hose assemblies.

- **Hose length tends to shorten under pressure as much as 4%, so allow sufficient slack.**
- **Do not bend the hose in an arc tighter than its minimum bend radius or in the case of aviation Type C fueling hose in an arc several inches larger than the recommended supported drum diameter.**
- **When exiting the fitting, keep the hose straight for a distance equal to least 2x the width of the hose's inside diameter. 4" ID = 8 inches.**
- **Use the straight lay line or marks on the cover to inspect for any possible hose twist.**
- **Limit hose bends to a single plane.**
- **Make installations neat and accessible for future maintenance.**



You are responsible for routine inspections of your hose assemblies.

It is the responsibility of the user to conduct at least monthly inspections of hose assemblies for wear, as well as any movement of the fittings on the end of the hoses. In addition, pressure testing of an assembly to a minimum of working pressure should be conducted at least every six months.

An Important Hose Assembly Check



When you receive a new hose assembly. Make sure that there is a white line behind the collar on both ends of the hose. If it is not there, the hose may not have been tested. Reject it.



Photo A



Photo B



Photo C



Photo D



Photo E

You should immediately discard your hose assembly if it is:

- More than 10 years old.
- Indicating general signs of wear.
- Stored for more than two years.
- Put into service, then removed and not rotated back into service within 15 days.
- Showing any movement of the permanent fittings on the end of the hose. The hose assembly should have a white line below the fitting ferrules/collars (**Photo A**). If this line begins to move away from the collar (**Photo B**), the hose must immediately be removed from service.
- Showing any movement of the reusable fittings on the end of the hose. It is acceptable for the white line to move during pressure testing—between its normal fitting position (**Photo C**) and while under 600 psi pressure (**Photo D**); but it should immediately return to its normal position after testing. If it does not, the hose should be discarded.
- In service with a hose cover that has cracks, nicks, and/or gouges in which the braid or spiral wraps are visible (**Photo E**). Small surface cracks in the cover are acceptable, but the hose should be pressure tested to a minimum of working pressure to confirm the integrity of the hose.



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Let's talk about the Kinks



A little known change happened in EI 1529 2014.
Cycle testing went from 1000 cycles to 10000 cycles

6.5.8 Kink resistance test

Use the following procedures to test the hose for kink resistance:

- a. Prepare the test hose by filling it with Reference Fuel B as described in ASTM D 471, and leaving it to soak for $168 \pm$ two hours at $20 \text{ }^\circ\text{C} \pm 5 \text{ }^\circ\text{C}$ ($68 \text{ }^\circ\text{F} \pm 9 \text{ }^\circ\text{F}$).
- b. Empty the hose and cap both ends.
- c. Bend the empty hose at $20 \text{ }^\circ\text{C} \pm 5 \text{ }^\circ\text{C}$ ($68 \text{ }^\circ\text{F} \pm 9 \text{ }^\circ\text{F}$) to form a kink with an included angle of 60 degrees. Hold the hose in position for one minute.
- d. Release the hose and allow it to recover for two to four minutes.
- e. For all sizes of hose, repeat steps (c) and (d) for 10 000 cycles continuously. At the completion of the 10 000 cycles visually examine the hose for permanent deformation and structural damage. Measure the electrical resistance while empty to ensure it meets the limits of 4.4.8.
- f. Pressure test the hose with water up to the minimum proof pressure specified in 4.4.4. The hose shall pass the minimum proof pressure.
- g. Cut a section of the hose at the kink and visually inspect the hose for delamination and structural damage to the tube, reinforcement, or outer cover. Report all findings.



What does this mean to you and your customers?

We all know that aviation Type C and Type CT do kink in service. New hoses may occasionally arrive with a kink prior to service.

The 10000 Cycle test takes away the concern about failures due to kinking.

Customers no longer need to ask for a replacement hose just because it arrives with a kink prior to use or becomes kinked during the warranty period.



Let's talk about the two year Shelf life as recommended in EI 1540 and ATA 103

According to both specifications, one has to scrap any hose that is not put into service within two years..

Many people have asked me “When does this time table start and when does it end?”.

The date you use is the quarter and year of manufacture marked on the bulk hose. Not the date an assembly is built and tested.

It ends after two years at the end of the quarter/year it was built.
Example: Starts 1Q24 Ends at the end of 1Q26



This two year shelf life rule probably goes back to the initial development of the specifications for aviation ground fueling hoses.

We, as a manufacturer, routinely scrap aviation hose after two years and it can be costly due to changes in demand every year.

Even if it the hose shows no signs of aging and looks like new, the hose has to be scrapped.

Vehicle builders and end users have to scrap hose if they forget to install the hose within the two year shelf life.

International customers ask that hose be no older than 6 months prior to assembly and testing due to shipping transit times to customer's site.



This shelf life rule is too short and really needs to be reviewed and extended to at least 3 years. 4 years would be even better.

The storage perimeters and conditions need to be reviewed and clearly defined as to where, how and at what temperatures?

I encourage that the Energy Institute and JIG review the 2 year shelf life rule with the experts in the rubber field to see if this can be revised.





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Thank you

