



AEROSPACE RECOMMENDED PRACTICE

ARP1658™**REV. C**

Issued 1982-03
Reaffirmed 2014-10
Revised 2024-02

Superseding ARP1658B

Hose Assemblies, Installed, Visual Inspection Guide for

RATIONALE

Added damage limits for hoses with integral silicone firesleeves (code H only) and broken clamps.

1. SCOPE

This SAE Aerospace Recommended Practice (ARP) covers visible surface defects on aerospace hose assemblies which have been installed and are functioning within a working environment at the time of visual inspection.

1.1 Purpose

This document is intended to help those who are conducting periodic visual inspections of hose assemblies used in aerospace systems and ground servicing equipment to determine time for replacement by condition of hose assemblies at time of inspection. This practice is intended to augment existing procedures for replacement of hose assemblies based on service time.

- 1.1.1 A constant surveillance of all hose assemblies for visible wear, defects, and/or damage shall be routine at all times of maintenance. When wear, defects, or damage to installed hose assemblies is detected, the hose assemblies shall be tagged or replaced in accordance with Section 4 of this document.

2. REFERENCES

2.1 Related Publications

The following publications are provided for information purposes only and are not a required part of this SAE Technical Report.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

AIR4092 Investigation of PTFE "Melt" Phenomenon for High-Pressure Hoses

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For more information on this standard, visit
<https://www.sae.org/standards/content/ARP1658C/>

2.1.2 U.S. Government Publications

Copies of these documents are available online at <https://quicksearch.dla.mil>.

FED-STD-162a Hose, Rubber, Visual Inspection Guide

MIL-STD-177 Rubber Products, Terms for Visible Defects of

MIL-STD-407 Visual Inspection Guide for Rubber Molded Products

2.2 Definitions

The following terms defining types of visible defects on installed hose assemblies shall apply specifically to this document.

ABRASION: The wearing away by friction, especially hose cover or reinforcement which evidence damage, fraying, etc., due to rubbing or vibrating against another hose or permanent fixture in an installation.

BROKEN CLAMPS: Loose, broken, or damaged firesleeve clamps which evidence a failure to properly secure firesleaving to a hose assembly.

BROKEN WIRES: On hose with wire-braided jacket or cover, a strand of wire, or multiple strands of wire forming a plait, which is severed or broken in two due to abrasion, flexing, or stress fatigue.

CHALKING: The formation of a powdery surface condition due to disintegration of firesleaving or hose cover material by weathering or other destructive environments.

CHECKING: Short, shallow cracks on the surface of an elastomeric hose cover material resulting from damaging action of environmental conditions.

CORROSION: A physical discoloration of hose cover or reinforcement indicative of material degradation due to extreme heat, chemical attack, weathering, oxidation, etc.

COVER BLISTERS: Raised areas or spots on an elastomeric hose cover surface usually forming a void or air-filled space in the material.

CRACKED SLEEVE: A firesleeve which evidences surface cracks or fissures caused by strain and environmental conditions.

CRAZING: A surface effect on elastomeric hose cover material characterized by multitudinous minute cracks.

HEAT DAMAGE: Charring, chalking, or hardening and cracking of hose cover caused by excessive or prolonged exposure to heat. Other evidence may include fluid leakage from socket where fitting or coupling is attached to hose.

KINKING: A temporary or permanent distortion of a hose, induced by winding or doubling upon itself and consequently exceeding the recommended minimum bend radius established for that hose.

LEAKER: (1) A crack or hole in the tube which allows fluids to escape. (2) A hose assembly which allows fluids to escape at the fittings or couplings.

LOOSE COVER: A separation of the cover from the carcass or reinforcements.

SOAKED SLEEVE: A firesleeve so saturated with fluid conveyed by the hose assembly the sleeve is mounted to that sweating or permeation of the fluid through the firesleeve results. (A soaked sleeve is usually indicative of a damaged or faulty hose assembly or spillage of fluid from a nearby port.)

TEARS: A sharp break or fissure in the surface of a hose cover, generally caused by strain and service conditions.

TORN SLEEVE: A firesleeve which evidences surface tear, or which has been stretched in two or fissured to the degree that it will no longer provide adequate fire protection to the hose assembly.

TWIST: A hose or hose assembly subjected to internal pressures or improperly installed so that each end of the hose is turned awkwardly about the hose axis in opposing directions.

WEATHERING: The surface deterioration of a hose cover during outdoor exposure, such as checking, cracking, crazing, or chalking.

WIRE THROW-OUT: In braided hose, a broken end or ends in the wire reinforcements protruding from the surface of the braid.

3. REQUIREMENTS

The following inspection procedure shall be in effect commencing with the receipt of equipment, containing hose assemblies, by the user.

3.1 Inspection Records

Appropriate work orders, job sheets, technical orders (TOs) and maintenance service records shall contain requirements for visual hose inspection and sign-off indicating that the inspections were made.

3.2 Frequency of Inspections

3.2.1 Routine Visual Inspection

Shall be made on all exposed hose assemblies each time the equipment is serviced.

3.2.2 Complete Visual Inspection

Shall be made at user's approved schedule (recommend inspection twice annually).

3.3 Inspection Procedures

3.3.1 Routine Visual Inspection

Shall consist of a constant surveillance of those hose assemblies exposed during routine servicing of the equipment. The operator or mechanic is to look for visible evidence of leakage, wear, damage, or abuse and replace in accordance with classification of defects (see Section 4).

3.3.2 Complete Visual Inspection

Shall consist of a thorough examination of all hose assemblies on the equipment. The operator or mechanic shall trace through the entire system examining the hose assemblies for evidence of leakage, wear, damage, or abuse and replace in accordance with classification of defects (see Section 4).

3.3.3 Disposition of Defective Assemblies

When leaky, worn, damaged, or abused hose assemblies are found, they shall be tagged or replaced if necessary and the cause shall be corrected or eliminated. A full report shall be made so that similar equipment may likewise be corrected.

4. CLASSIFICATION OF DEFECTS

Defects observed shall fall into two classifications: minor and major.

4.1 Minor Defects

Minor defects, when observed, should be tagged for future observations and/or replacement.

4.2 Major Defects

Major defects should be replaced immediately.

5. IDENTIFICATION OF DEFECTS

5.1 Kinked

Minor: In body of low-pressure hose.

Major: If near fitting, indicating possible heavy stress, or in medium- or high-pressure hose assemblies.

5.2 Broken Wires

Minor: If isolated random occurrence.

Major: If two or more wires in one plait broken (see 2.2), or if breakage of several wires is concentrated in one section.

5.3 Abrasion

Minor: If confined to no more than two wires.

Major: If extended throughout one plait or from one plait to another.

Minor: For rubber covered hose if confined to rubber cover of hose.

Major: For rubber covered hose if wire is exposed.

Minor: Para-aramid reinforced hose if straw colored reinforcement is not exposed.

Major: Para-aramid reinforced hose if straw colored reinforcement is exposed.

5.4 Corrosion

Minor: A discoloration of the hose cover or reinforcement but no physical corrosion is detectable.

Major: If any corrosion of wire is detectable.

5.5 Twisted

Minor: On all spirally reinforced hose.

Major: If wires are broken or liner cannot be rounded out.

5.6 Cracked Firesleeve (Integral)

Minor: If only surface crazing and no excessive hardening.

Major: If hose is exposed or if significant hardening (correct cause of apparent over temperature exposure).

5.7 Wetted Firesleeve

Minor: Light intermittent external surface only.

Major: If fiberglass wetted or if sleeve (integral or slip-on) is submerged.

5.8 Torn Firesleeve (Slip-On)

Minor: Shallow superficial tear with no material missing.

Major: If fiberglass is exposed.

5.9 Damaged Firesleeve (Silicone Damage)

Minor: Damage to the integral silicone firesleeve, hose, or sleeve code H only, resulting in removed material within the following maximum dimensional parameters: 0.030 inch deep x 0.250 inch wide x 0.500 inch long. A single occurrence of noted damage is permissible along any given 11 inches length of hose, no replicates permissible.

NOTE: The above was validated via testing on the smallest hose style/size combination for which the hose manufacturer is on the Performance Review Institute's Qualified Provider List (refer to <https://www.eAuditNet.com>). Hose OCMs have retained test reports (ETR-49108—Eaton, ER21-40411-01—Parker, and T26093—Titeflex) which affirmed this capability when tested in accordance with AS1055 at the pressures and flow rates required of the H hose or sleeve code only. End user must verify applicability of the aforementioned damage tolerance to their hose product before applying these parameters. Refer to applicable individual product standards for definition of sleeve code H (i.e., AS115, AS640, etc.) and respective AS1055 fire test pressures, flow rates, and durations.

Major: Anything in excess of "minor."

5.10 Broken Clamps (Firesleeved Hose)

Minor: Exhibits looseness of the firesleeve at the end fitting. This looseness shall not allow exposure of the socket or any hose in the installed condition. The sleeve must not be saturated with fluid.

Major: Anything in excess of "minor."

5.11 Leakers

Minor: A leak which can be stopped by tightening a loose swivel nut. Any leak that can be stopped by tightening swivel nut to maximum recommended torque.

Major: A tear or defect in the hose assembly or fitting causing a leak. Any leak that cannot be overcome by tightening swivel nut or retaining bolts (flange) to maximum recommended torque.

5.12 PTFE "Melt" Phenomenon

Minor: None.

Major: Visible signs of PTFE material, typically "whisker"-like appearance, leaching past reinforcement wire braid.

6. NOTES

6.1 Revision Indicator

A change bar (I) located in the left margin is for the convenience of the user in locating areas where technical revisions, not editorial changes, have been made to the previous issue of this document. An (R) symbol to the left of the document title indicates a complete revision of the document, including technical revisions. Change bars and (R) are not used in original publications, nor in documents that contain editorial changes only.

NOTE: Figure in Minor or Major Column indicates plate number. No number means no photo available.

	LOW PRESSURE RUBBER HOSE (a)			MEDIUM PRESSURE RUBBER HOSE (FABRIC COVERED) (b)			MEDIUM PRESSURE RUBBER HOSE (SS RE-INFORCED) (c)			HIGH PRESSURE RUBBER HOSE (RUBBER COVERED) (d)			LOW & MEDIUM PRESSURE PTFE HOSE (e)			HIGH PRESSURE PTFE HOSE (f)			FIRE-SLEEVED HOSE		
	Applicable	Minor	Major	Applicable	Minor	Major	Applicable	Minor	Major	Applicable	Minor	Major	Applicable	Minor	Major	Applicable	Minor	Major	Applicable	Minor	Major
Kinked Assemblies	X	1	2	X	3	4	X	5	6				X	7	8						
Abrasion	X	9	10	X	11	12	X	13	14	X	15	16	X	17	18	X	19	20 88			
Weathering	X	21	22							X	23	24									
Heat Cracking	X	25	26																		
Leaker	X	27	28	X	29	30	X	31	32	X	33	34	X	35	36	X	37	38	X	39	40
Tears	X	41	42							X	43	44									
Twist				X	45	46				X	47	48	X	49	50	X	51	52			
Corrosion				X	53	54	X	55	56	X	57	58	X	59	60	X	61	62			
Heat Damage				X	63	64	X	65	66	X	67	68									
Broken Wires (plys)				X	69	70	X	71	72				X	73	74	X	75	76			
Cover Blisters										X	77	78									
Cover Cracks										X	79	80									
Cracked Sleeve																			X	81	82
Torn Sleeve																			X	83	84
Broken Clamps																			X	85	
Soaked Sleeve																			X	86	
PTFE "Melt" Phenomenon (g)																X		87			

(a) MIL-H-5593

(b) MIL-H-8794

(c) MIL-H-83797

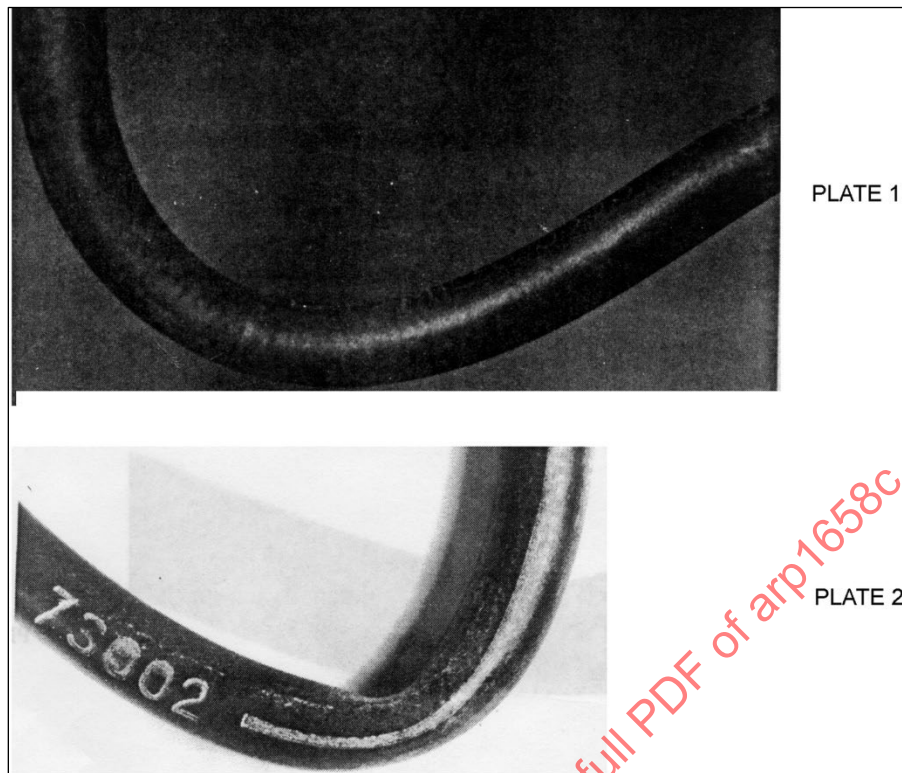
(d) MIL-H-8788

(e) MIL-H-25579, MIL-H-27267, AS620, AS1227, AS1946 or AS4897

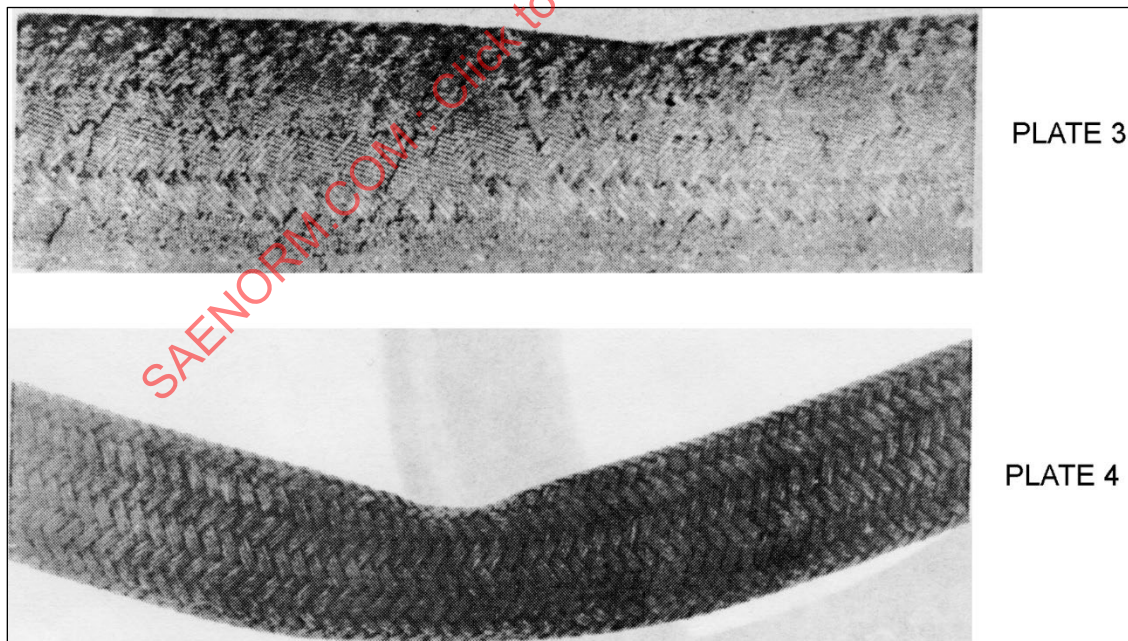
(f) MIL-H-38360, AS604, AS614, AS1339, AS1975, AS4098, AS4604 or AS4623

(g) Applicable to AS1339 only (see AIR4092)

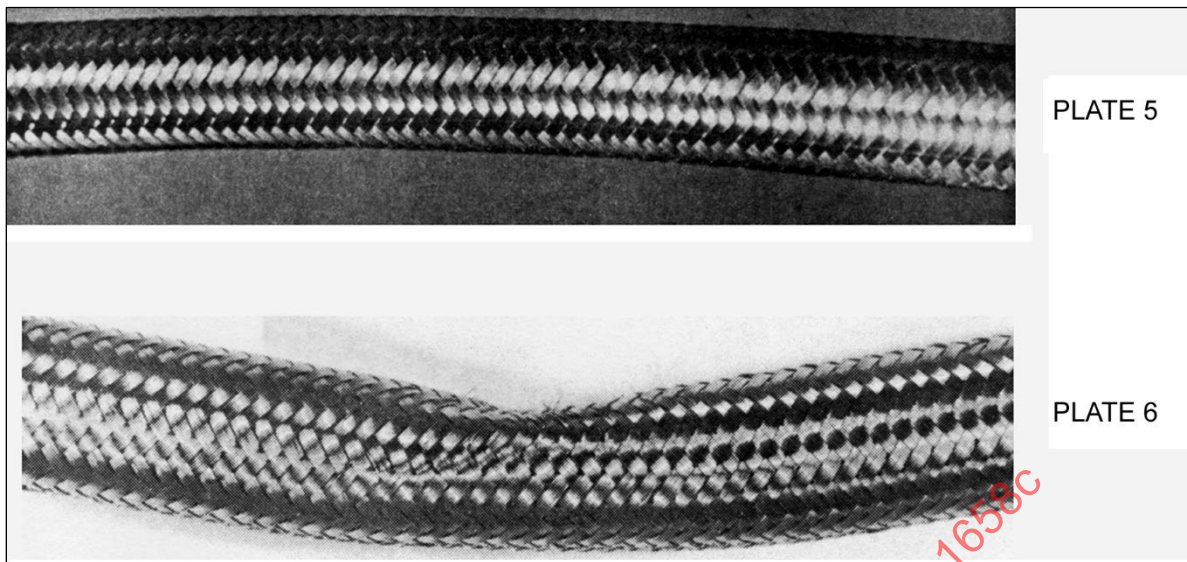
Figure 1 - Pictorial reference by hose type and defects



**Figure 2 - Kinked assemblies - minor and major
low-pressure rubber hose
(MIL-H-5593)**



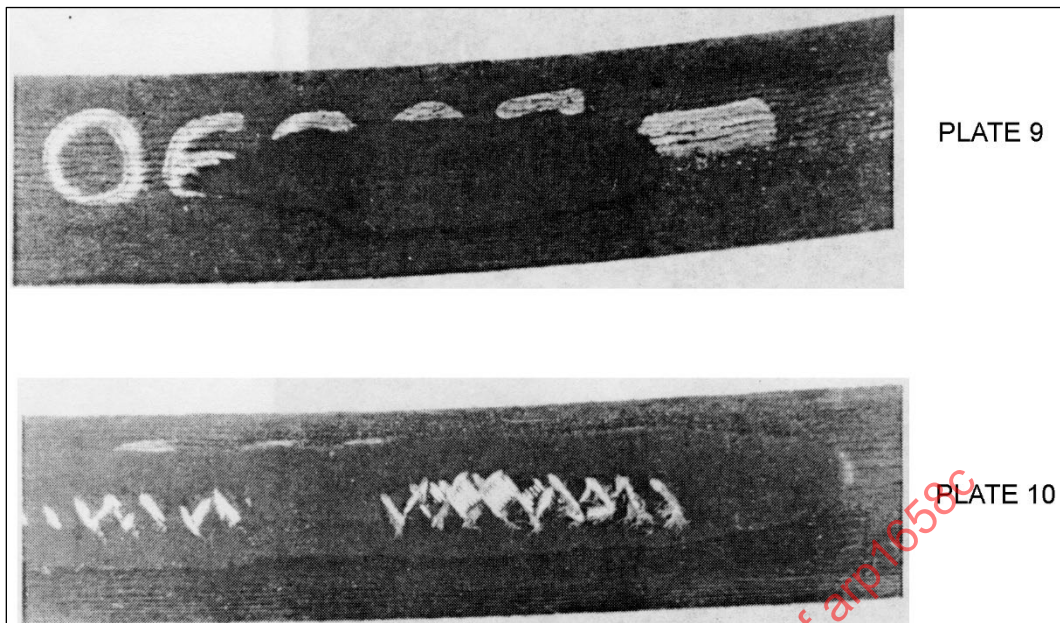
**Figure 3 - Kinked assemblies - minor and major
medium-pressure rubber hose with fabric cover
(MIL-H-8794)**



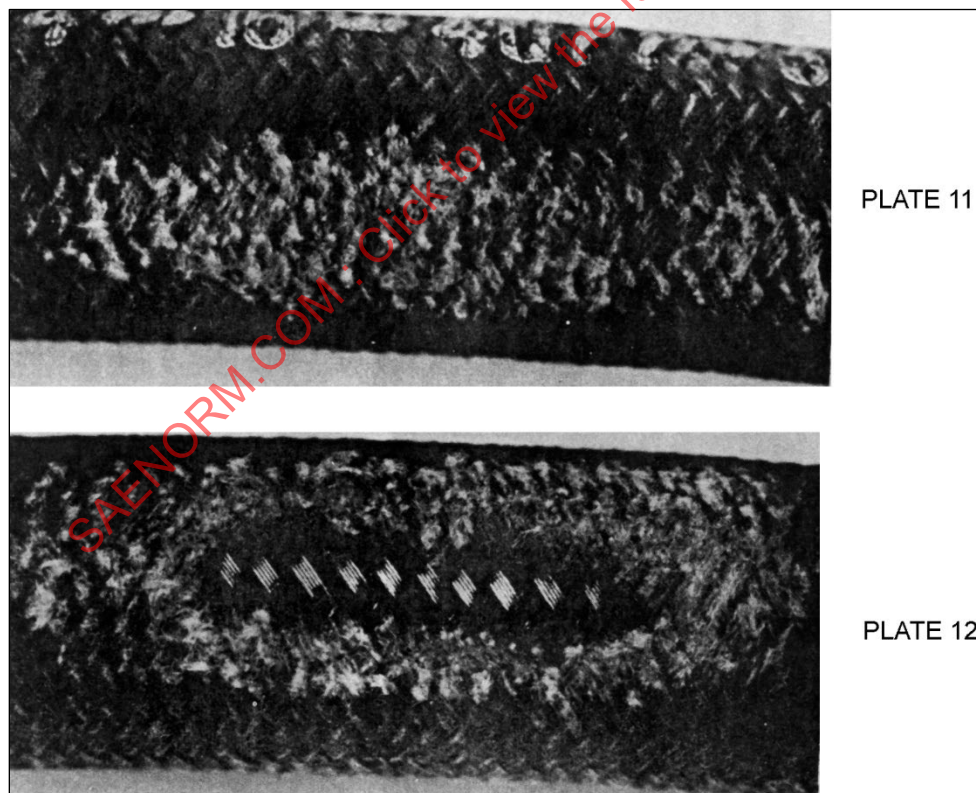
**Figure 4 - Kinked assemblies - minor and major
medium-pressure rubber hose with stainless steel reinforcement
(MIL-H-83797)**



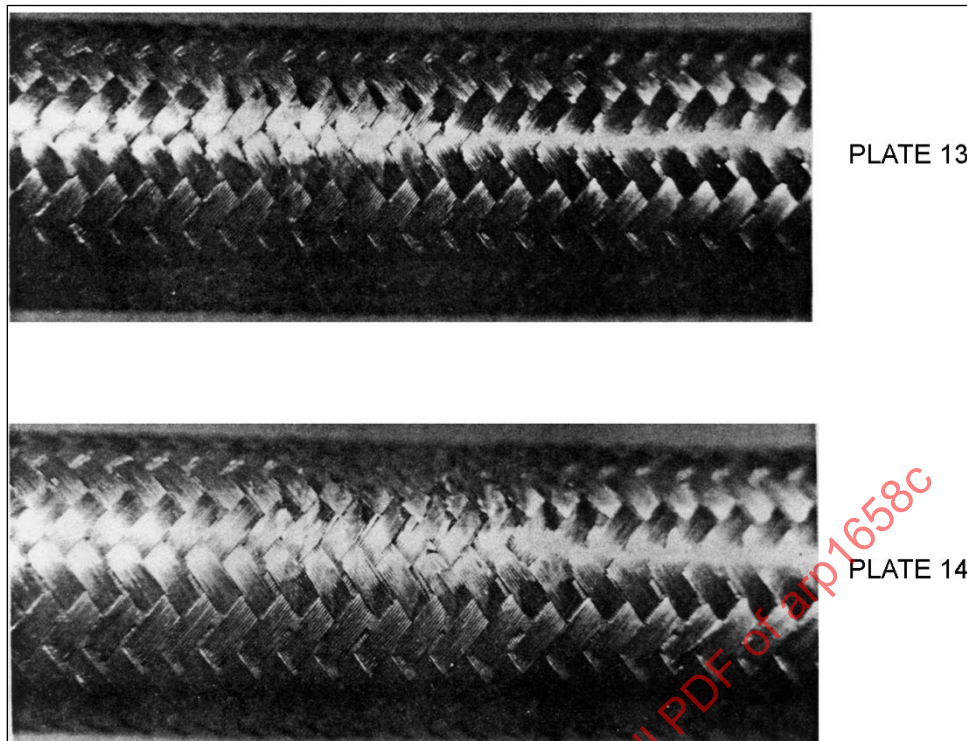
**Figure 5 - Kinked assemblies - minor and major
low and medium-pressure PTFE hose
(MIL-H-25579/MIL-H-27267, AS620, AS1227, or AS1946)**



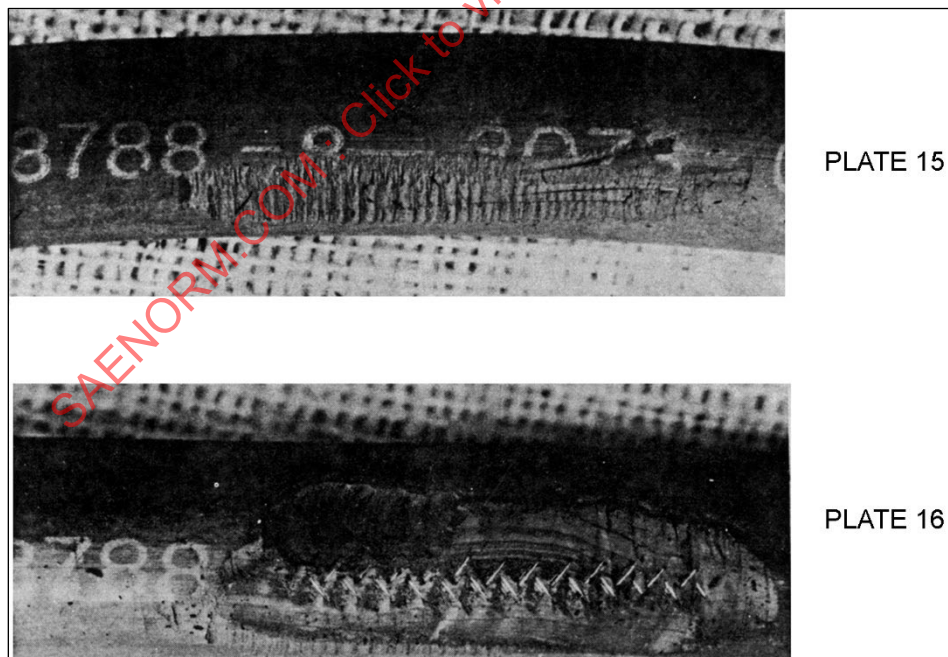
**Figure 6 - Abrasion - minor and major
low-pressure rubber hose
(MIL-H-5593)**



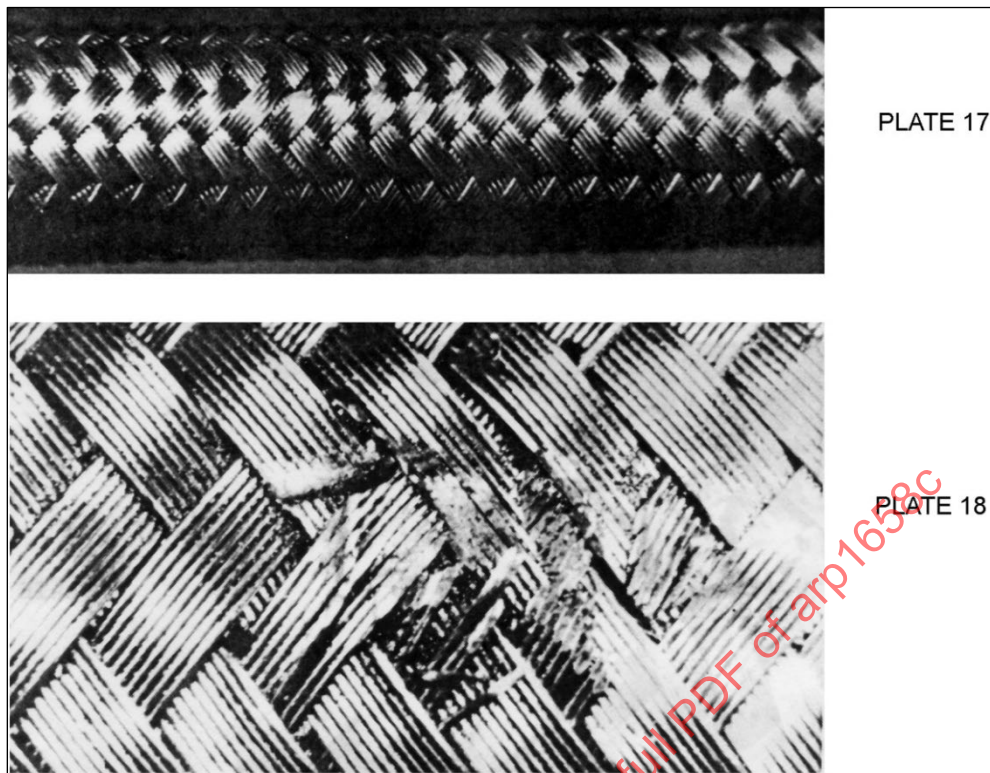
**Figure 7 - Abrasion - minor and major
medium-pressure rubber hose with fabric cover
(MIL-H-8794)**



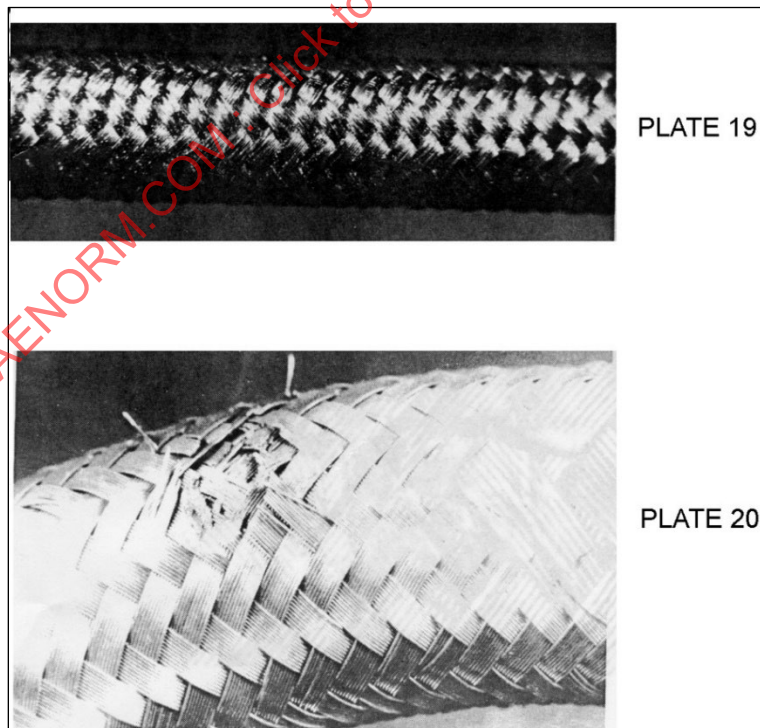
**Figure 8 - Abrasion - minor and major
medium-pressure rubber hose with stainless steel reinforcement
(MIL-H-83797)**



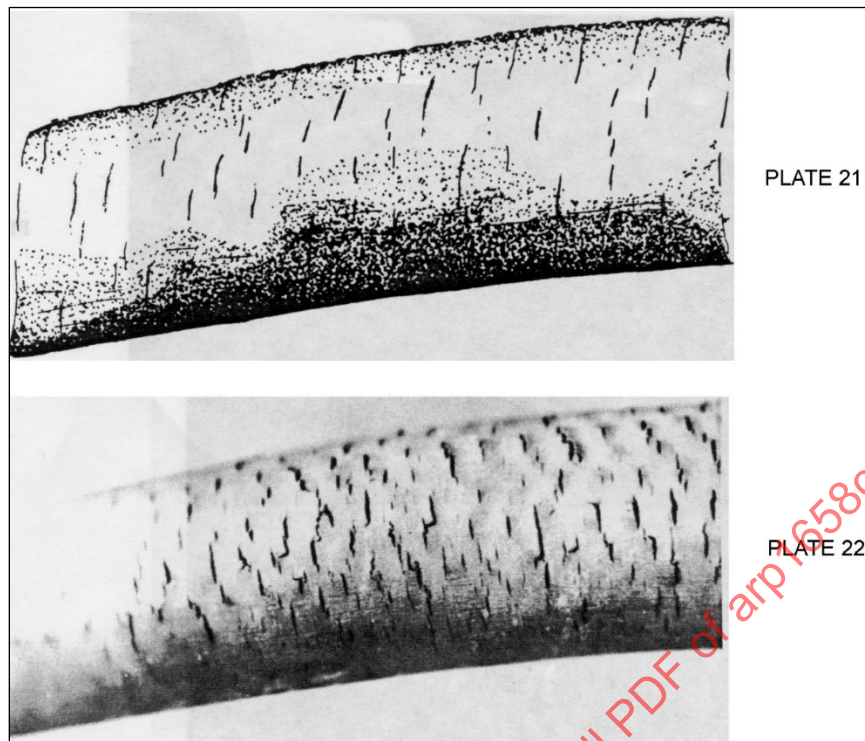
**Figure 9 - Abrasion - minor and major
high-pressure rubber hose with rubber cover
(MIL-H-8788)**



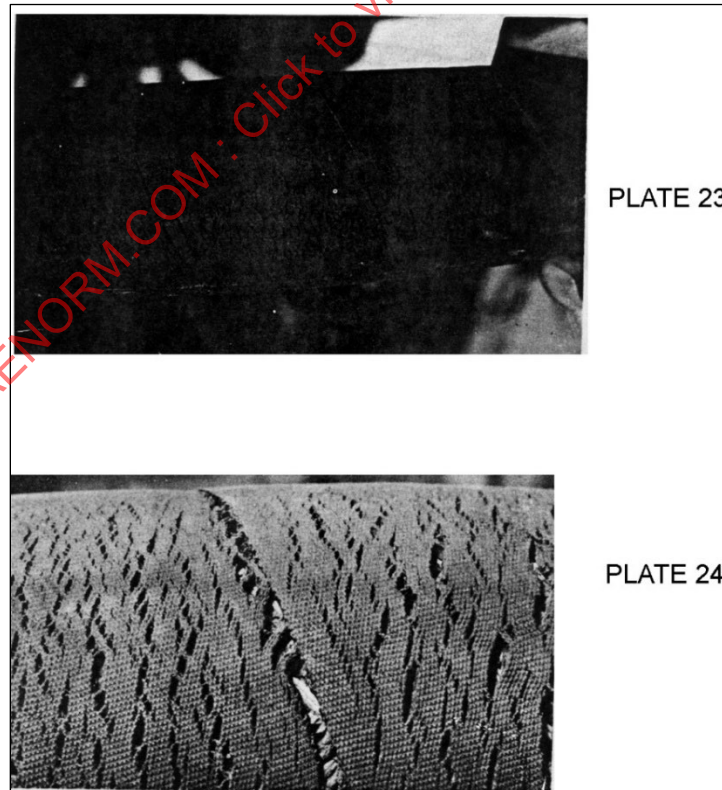
**Figure 10 - Abrasion - minor and major
low and medium-pressure PTFE hose
(MIL-H-25579/MIL-H-27267, AS620, AS1227, or AS1946)**



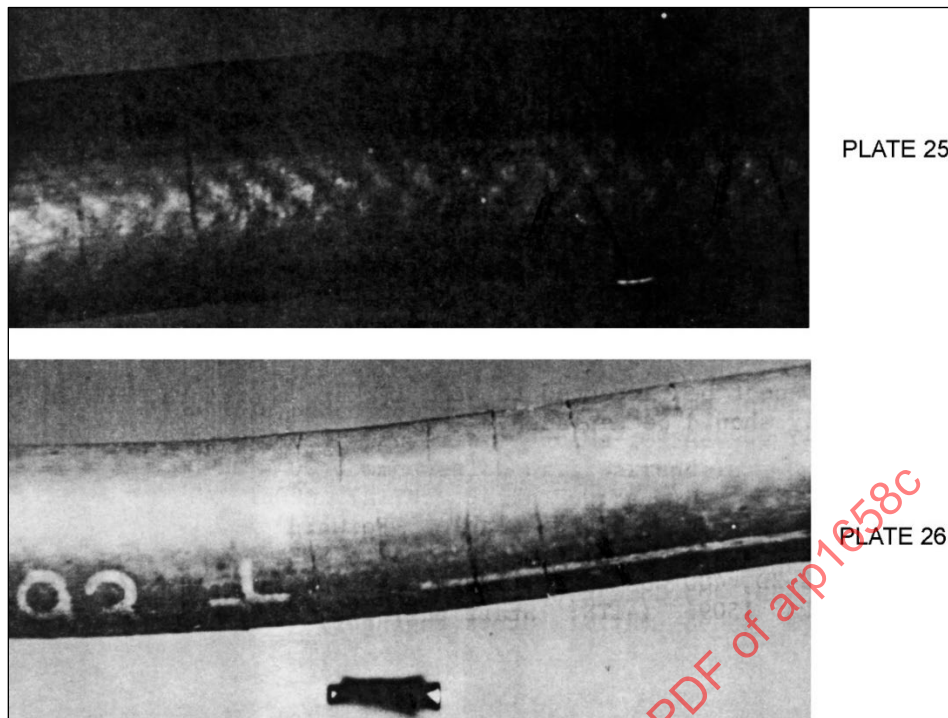
**Figure 11 - Abrasion - minor and major
high-pressure PTFE hose, metallic reinforced
(MIL-H-38360, AS604, AS614, AS1339, AS4098, or AS4604)**



**Figure 12 - Weathering - minor and major
low-pressure rubber hose
(MIL-H-5593)**



**Figure 13 - Weathering - minor and major
high-pressure rubber hose with rubber covering
(MIL-H-8788)**



**Figure 14 - Heat cracking - minor and major
low-pressure rubber hose
(MIL-H-5593)**

Minor Leaker

Must be correctable to prevent further leakage, i.e.,
(tightening end fittings)

PLATE 27

Sample photo not available. Forward
candidate reproducible photos to SAE
G-3D, 400 Commonwealth Dr., Warrendale,
PA 15096 (ATTN: Staff Engineer)

Major Leaker

Cannot be corrected to stop leakage, therefore,
the hose assembly should be replaced.

PLATE 28

Sample photo not available. Forward
candidate reproducible photos to SAE
G-3D, 400 Commonwealth Dr., Warrendale,
PA 15096 (ATTN: Staff Engineer)

**Figure 15 - Leaker - minor and major
low-pressure rubber hose
(MIL-H-5593)**

Minor Leaker Must be correctable to prevent further leakage, i.e., (tightening end fittings)	
Sample photo not available. Forward candidate reproducible photos to SAE G-3D, 400 Commonwealth Dr., Warrendale, PA 15096 (ATTN: Staff Engineer)	PLATE 29
Major Leaker Cannot be corrected to stop leakage, therefore, the hose assembly should be replaced.	
Sample photo not available. Forward candidate reproducible photos to SAE G-3D, 400 Commonwealth Dr., Warrendale, PA 15096 (ATTN: Staff Engineer)	PLATE 30

Figure 16 - Leaker - minor and major medium-pressure rubber hose with fabric cover (MIL-H-8794)

Minor Leaker Must be correctable to prevent further leakage, i.e., (tightening end fittings).	
Sample photo not available. Forward candidate reproducible photos to SAE G-3D, 400 Commonwealth Dr., Warrendale, PA 15096 (ATTN: Staff Engineer)	PLATE 31
Major Leaker Cannot be corrected to stop leakage therefore, the hose assembly should be replaced.	
Sample photo not available. Forward candidate reproducible photos to SAE G-3D, 400 Commonwealth Dr., Warrendale, PA 15096 (ATTN: Staff Engineer)	PLATE 32

Figure 17 - Leaker - minor and major medium-pressure rubber hose with stainless steel reinforcement (MIL-H-83797)

Minor Leaker Must be correctable to prevent further leakage, i.e., (tightening end fittings).	PLATE 33
Sample photo not available. Forward candidate reproducible photos to SAE G-3D, 400 Commonwealth Dr., Warrendale, PA 15096 (ATTN: Staff Engineer)	
Major Leaker Cannot be corrected to stop leakage therefore, the hose assembly should be replaced.	PLATE 34
Sample photo not available. Forward candidate reproducible photos to SAE G-3D, 400 Commonwealth Dr., Warrendale, PA 15096 (ATTN: Staff Engineer)	

**Figure 18 - Leaker - minor and major
high-pressure rubber hose with rubber cover
(MIL-H-8788)**

Minor Leaker Must be correctable to prevent further leakage, i.e., (tightening end fittings).	PLATE 35
Sample photo not available. Forward candidate reproducible photos to SAE G-3D, 400 Commonwealth Dr., Warrendale, PA 15096 (ATTN: Staff Engineer)	
Major Leaker Cannot be corrected to stop leakage therefore, the hose assembly should be replaced.	PLATE 36
Sample photo not available. Forward candidate reproducible photos to SAE G-3D, 400 Commonwealth Dr., Warrendale, PA 15096 (ATTN: Staff Engineer)	

**Figure 19 - Leaker - minor and major
low and medium-pressure PTFE hose
(MIL-H-25579/MIL-H-27267, AS620, AS1227, or AS1946)**

Minor Leaker

Must be correctable to prevent further leakage, i.e., (tightening end fittings).

Sample photo not available. Forward candidate reproducible photos to SAE G-3D, 400 Commonwealth Dr., Warrendale, PA 15096 (ATTN: Staff Engineer)

PLATE 37

Major Leaker

Cannot be corrected to stop leakage therefore, the hose assembly should be replaced.

Sample photo not available. Forward candidate reproducible photos to SAE G-3D, 400 Commonwealth Dr., Warrendale, PA 15096 (ATTN: Staff Engineer)

PLATE 38

**Figure 20 - Leaker - minor and major
high-pressure PTFE hose
(MIL-H-38360, AS604, AS614, AS1339, AS1975, AS4098, AS4604, or AS4623)**

Minor Leaker

Must be correctable to prevent further leakage without damage to the fire sleeve and the sleeve must not be saturated with fluid.

Sample photo not available. Forward candidate reproducible photos to SAE G-3D, 400 Commonwealth Dr., Warrendale, PA 15096 (ATTN: Staff Engineer)

PLATE 39

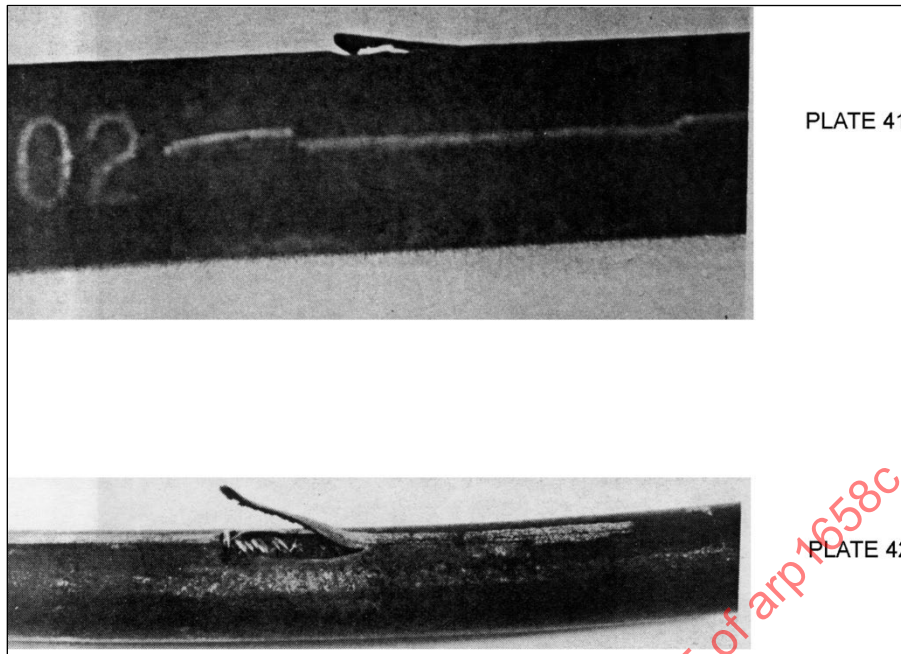
Major Leaker

Cannot be correctable to stop leakage therefore the hose assembly should be replaced.

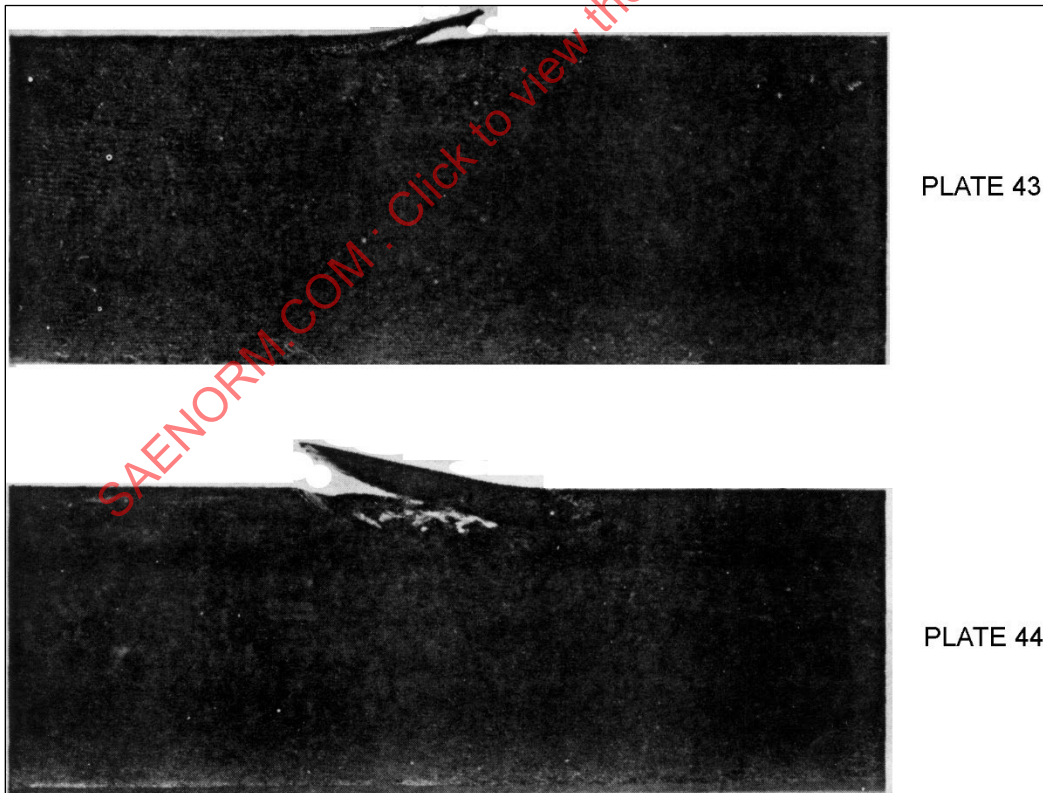
Sample photo not available. Forward candidate reproducible photos to SAE G-3D, 400 Commonwealth Dr., Warrendale, PA 15096 (ATTN: Staff Engineer)

PLATE 40

**Figure 21 - Leaker - minor and major
fire sleeved hose**



**Figure 22 - Tears - minor and major
low-pressure rubber hose
(MIL-H-5593)**



**Figure 23 - Tears - minor and major
high-pressure rubber hose with rubber covering
(MIL-H-8788)**

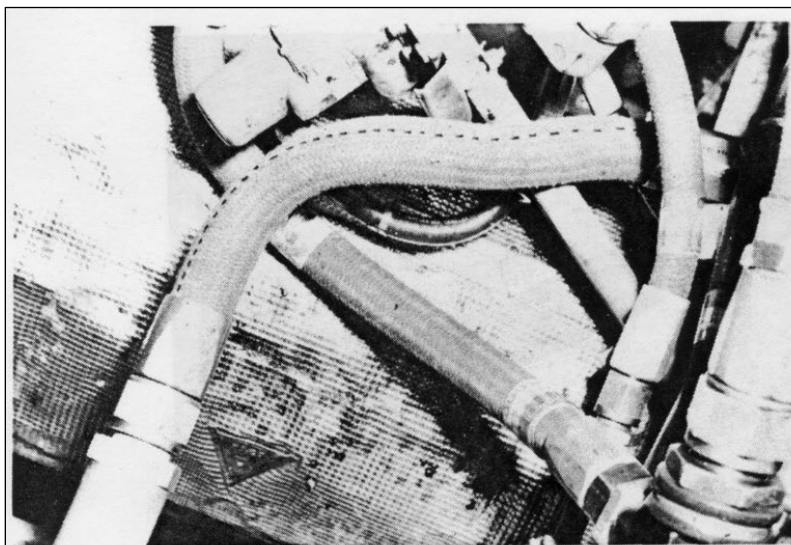
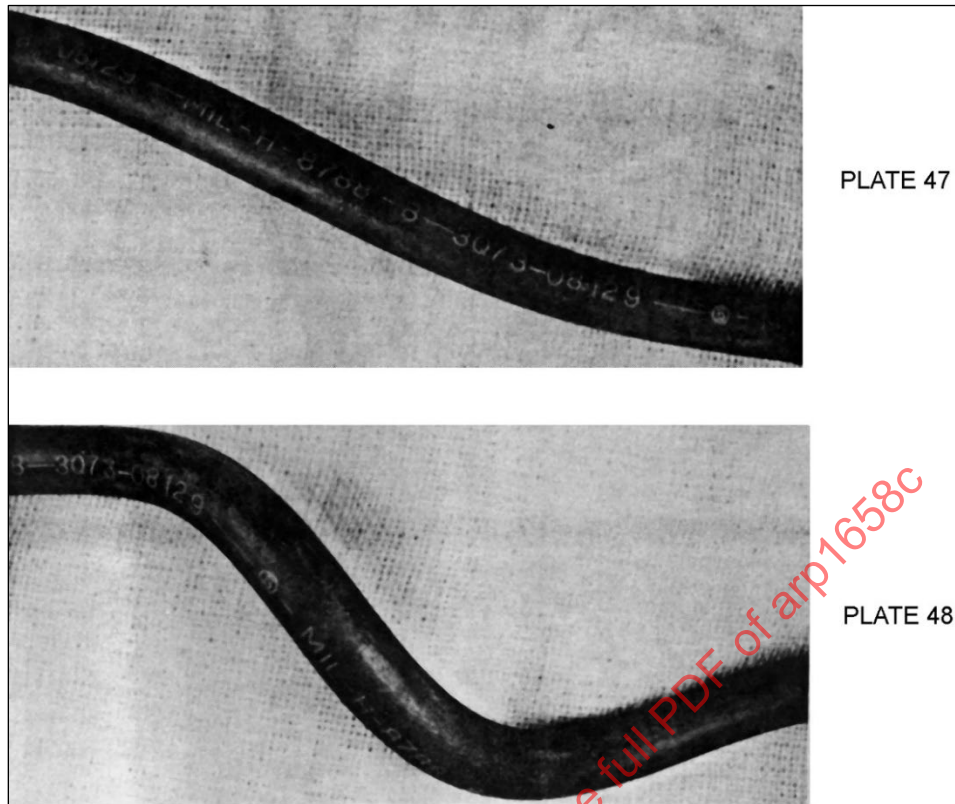


PLATE 45

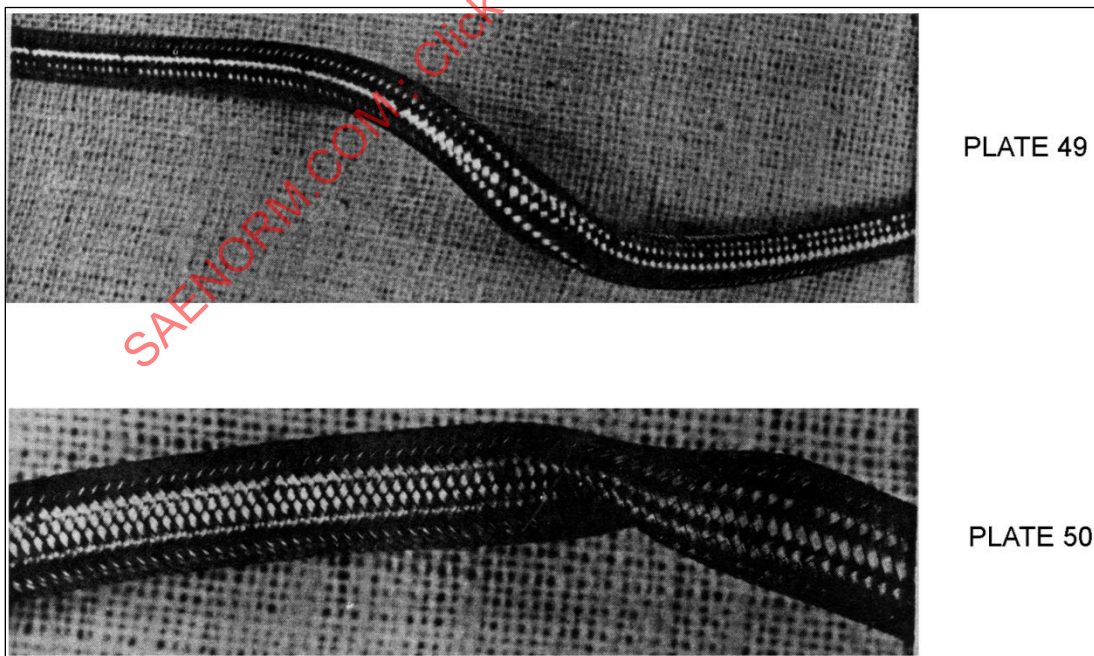


PLATE 46

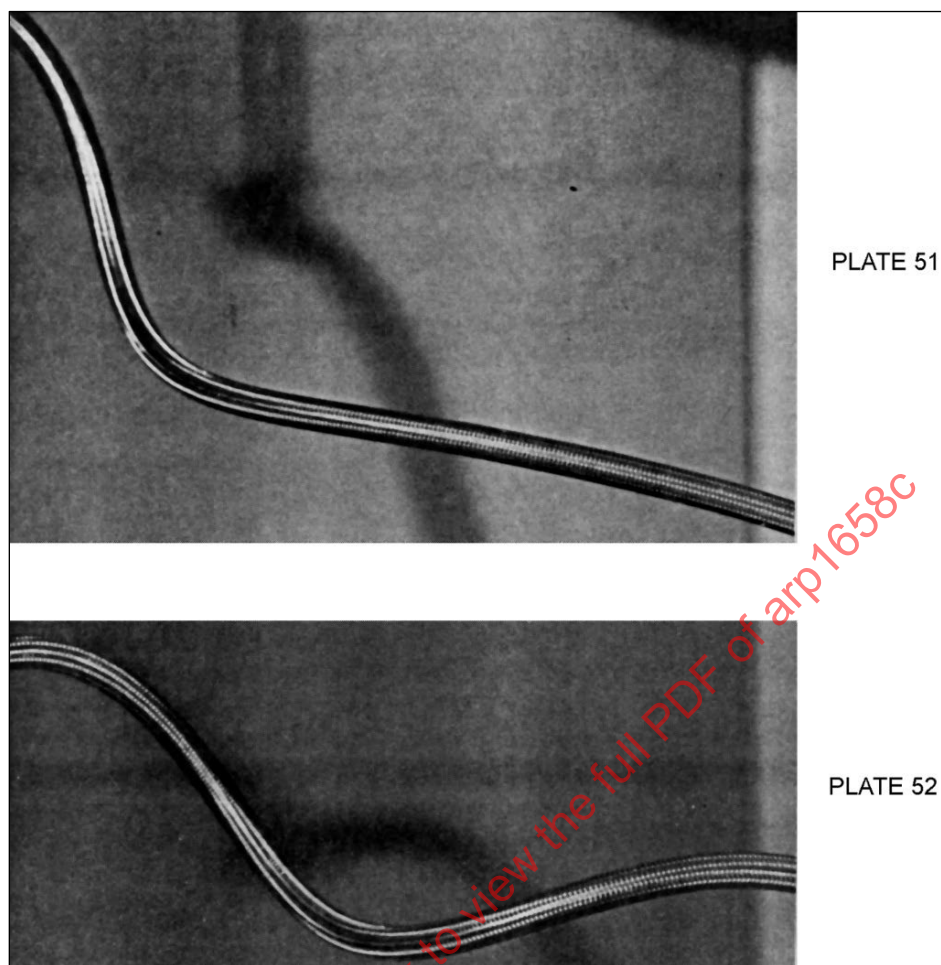
**Figure 24 - Twist - minor and major
medium-pressure rubber hose with fabric cover
(MIL-H-8794)**



**Figure 25 - Twist - minor and major
high-pressure rubber hose with rubber cover
(MIL-H-8788)**



**Figure 26 - Twist - minor and major
low and medium-pressure PTFE hose
(MIL-H-25579/MIL-H-27267, AS620, AS1227, or AS1946)**



**Figure 27 - Twist - minor and major
high-pressure PTFE hose
(MIL-H-38360, AS604, AS614, AS1339, AS1975, AS4098, AS4604, or AS4623)**

Any evidence of corrosion of the wire reinforcement is minor.

PLATE 53

Sample photo not available. Forward candidate reproducible photos to SAE, G-3D, 400 Commonwealth Dr., Warrendale, PA 15096 (ATTN: Staff Engineer)

Any evidence of corrosion of the wire reinforcement is major.

PLATE 54

Sample photo not available. Forward candidate reproducible photos to SAE, G-3D, 400 Commonwealth Dr., Warrendale, PA 15096 (ATTN: Staff Engineer)

**Figure 28 - Corrosion - minor and major
medium-pressure rubber hose with fabric cover
(MIL-H-8794)**

Any evidence of corrosion of the wire reinforcement is minor.

PLATE 55

Sample photo not available. Forward candidate reproducible photos to SAE G-3D, 400 Commonwealth Dr., Warrendale, PA 15096 (ATTN: Staff Engineer)

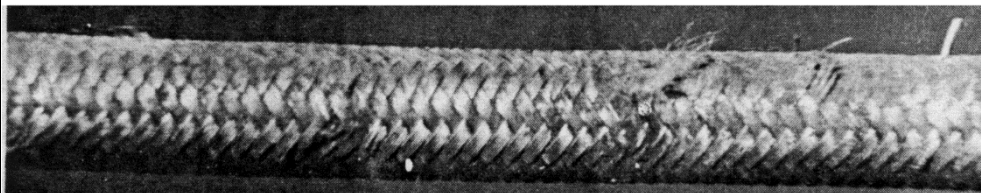


PLATE 56

**Figure 29 - Corrosion - minor and major
medium-pressure rubber hose with stainless steel reinforcement
(MIL-H-83797)**

Any evidence of corrosion of the wire reinforcement is minor.

Sample photo not available. Forward candidate reproducible photos to SAE G-3D, 400 Commonwealth Dr., Warrendale, PA 15096 (ATTN: Staff Engineer)

PLATE 57

Any evidence of corrosion of the wire reinforcement is major.

Sample photo not available. Forward candidate reproducible photos to SAE G-3D, 400 Commonwealth Dr., Warrendale, PA 15096 (ATTN: Staff Engineer)

PLATE 58

**Figure 30 - Corrosion - minor and major
high-pressure rubber hose with rubber cover
(MIL-H-8788)**

Any evidence of corrosion of the wire reinforcement is minor.

Sample photo not available. Forward candidate reproducible photos to SAE G-3D, 400 Commonwealth Dr., Warrendale PA 15096 (ATTN: Staff Engineer)

PLATE 59

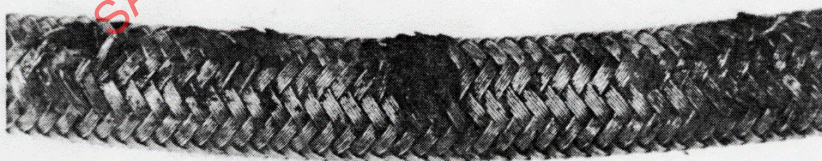


PLATE 60

**Figure 31 - Corrosion - minor and major
low and medium-pressure PTFE hose
(MIL-H-25579/MIL-H-27267, AS620, AS1227, or AS1946)**

Any evidence of corrosion of the wire reinforcement is minor.

Sample photo not available. Forward candidate reproducible photos to SAE
G-3D, 400 Commonwealth Dr., Warrendale
PA 15096 (ATTN: Staff Engineer)

PLATE 61

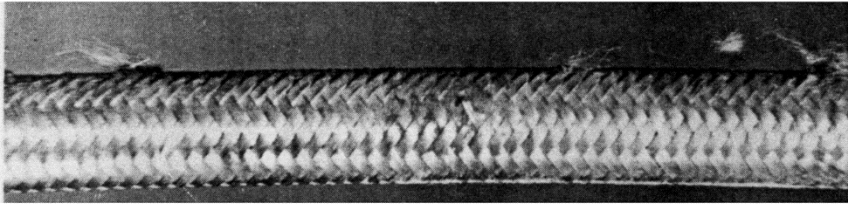


PLATE 62

**Figure 32 - Corrosion - minor and major
high-pressure PTFE hose
(MIL-H-38360, AS604, AS614, AS1339, AS4098, or AS4604)**

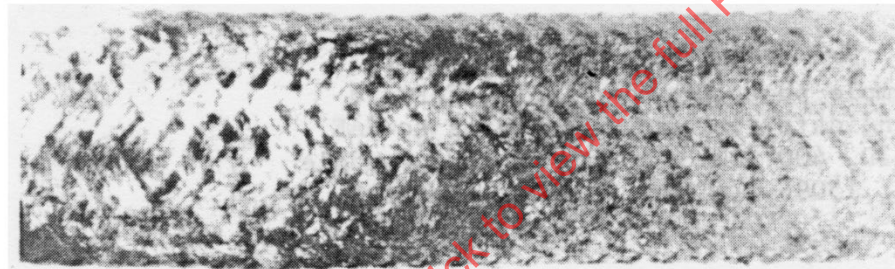


PLATE 63

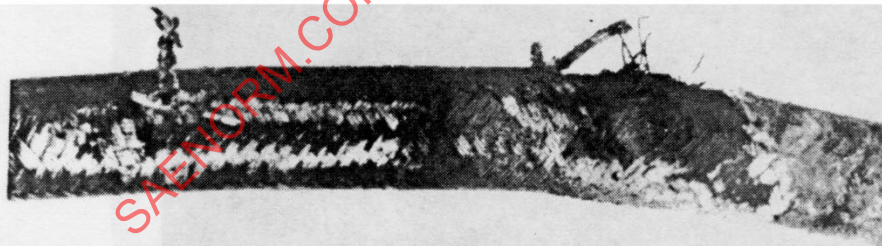


PLATE 64

**Figure 33 - Heat damage - minor and major
medium-pressure rubber hose with fabric cover
(MIL-H-8794)**

Minor - Any loss of the original flexibility of the hose.

Sample photo not available. Forward candidate reproducible photos to SAE
G-3D, 400 Commonwealth Dr., Warrendale
PA 15096 (ATTN: Staff Engineer)

PLATE 65

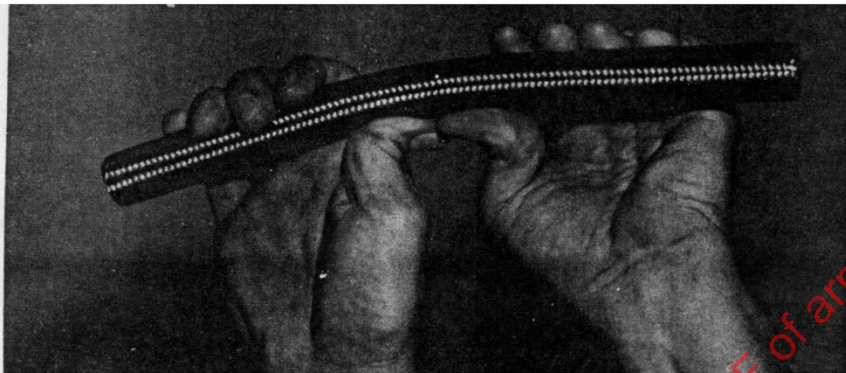


PLATE 66

**Figure 34 - Heat damage - minor and major
medium-pressure rubber hose with stainless steel reinforcement
(MIL-H-83797)**

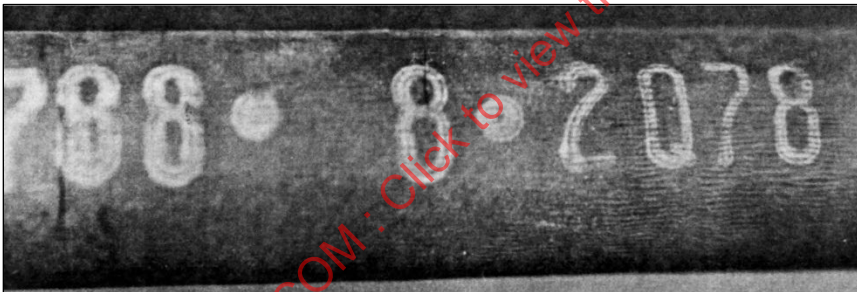


PLATE 67

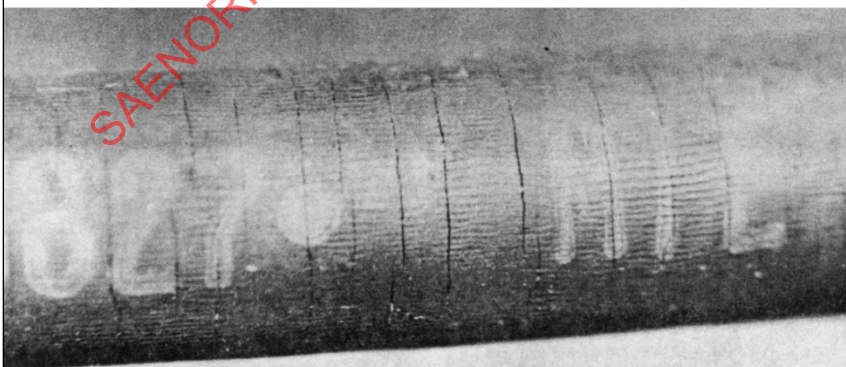


PLATE 68

**Figure 35 - Heat damage - minor and major
high-pressure rubber hose with rubber cover
(MIL-H-8788)**