

VISUAL INSPECTION GUIDE FOR INSTALLED HOSE ASSEMBLIES

1. SCOPE: This recommended practice 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 recommended practice 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 para. 4 (Classification of Defects) of this recommended practice.

2. APPLICABLE DOCUMENTS:

- 2.1 Federal Standards: Fed. Std. 162a, Hose, Rubber, Visual Inspection Guide For.

2.2 Military Standards:

MIL-STD-166 - Visual Inspection Guide for Rubber Hose.
MIL-STD-177 - Rubber Products, Terms for Visible Defects Of.
MIL-STD-407 - Visual Inspection Guide for Rubber Molded Products.

SAE Technical Board rules provide that: "All technical reports, including standards approved and practices recommended, are advisory only. Their use by anyone engaged in industry or trade or their use by governmental agencies is entirely voluntary. There is no agreement to adhere to any SAE standard or recommended practice, and no commitment to conform to or be guided by any technical report. In formulating and approving technical reports, the Board and its Committees will not investigate or consider patents which may apply to the subject matter. Prospective users of the report are responsible for protecting themselves against liability for infringement of patents."

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, T.O.'s 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 para. 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 para. 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.
- 4.1.1 Leakers: Any leakers should be replaced when the leak is determined not to be caused by a loose coupling connection.
- 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 high pressure hose assemblies.

- 5.2 Broken Wires: Minor if isolated random occurrence.
Major if two or more wires in one plait broken (ref. 6.3),
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.
- 5.4 Corrosion: Major if any detectable corrosion of wire.
- 5.5 Twisted: Major if wires are broken or liner cannot be rounded out.
Major on all spirally reinforced hose.
- 5.6 Cracked Firesleeve: Minor unless exposed to dripping or splashing which
might soak sleeve or fiberglass/asbestos is frayed.
- 5.7 Soaked Firesleeve: Minor. (Locate and correct source of fluid.)
- 5.8 Torn Firesleeve: Minor
- 5.9 Broken Clamps: Minor
6. DEFINITION OF TERMS: The following terms defining types of visible defects
on installed hose assemblies shall apply specifically to this specification.
- 6.1 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.
- 6.2 Broken Clamps: Loose, broken, or damaged firesleeve clamps which evidence
a failure to properly secure firesleeving to a hose assembly.
- 6.3 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.
- 6.4 Chalking: The formation of a powdery surface condition due to
disintegration of firesleeving or hose cover material by weathering or
other destructive environments.
- 6.5 Checking: Short, shallow cracks on the surface of an elastomeric hose
cover material resulting from damaging action of environmental conditions.
- 6.6 Corrosion: A physical discoloration of hose cover or reinforcement
indicative of material degradation due to extreme heat, chemical attack,
weathering, oxidation, etc.

- 6.7 Cover Blisters: Raised areas or spots on an elastomeric hose cover surface usually forming a void or air-filled space in the material.
- 6.8 Cracked Sleeve: A firesleeve which evidences surface cracks or fissures caused by strain and environmental conditions.
- 6.9 Crazing: A surface effect on elastomeric hose cover material characterized by multitudinous minute cracks.
- 6.10 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.
- 6.11 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.
- 6.12 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.
- 6.13 Loose Cover: A separation of the cover from the carcass or reinforcements.
- 6.14 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.
- 6.15 Tears: A sharp break or fissure in the surface of a hose cover, generally caused by strain and service conditions.
- 6.16 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.
- 6.17 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.
- 6.18 Weathering: The surface deterioration of a hose cover during outdoor exposure, such as checking, cracking, crazing or chalking.
- 6.19 Wire Throw-Out: In braided hose, a broken end or ends in the wire reinforcements protruding from the surface of the braid.

PREPARED BY
SAE COMMITTEE G-3
AEROSPACE FITTINGS, HOSE AND TUBING ASSEMBLIES

PICTORAL REFERENCE BY HOSE TYPE AND DEFECTS

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 TEFLON HOSE (e)			HIGH PRESSURE TEFLON 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			
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	
Torn Sleeve																			X	82	
Broken Clamps																			X	83	
Soaked Sleeve																			X	84	

(a) MIL-H-5593

(b) MIL-H-8794C

(c) MIL-H-83797

(d) MIL-H-8788B

(e) MIL-H-25579C & MIL-H-27267A

(f) MIL-H-38360

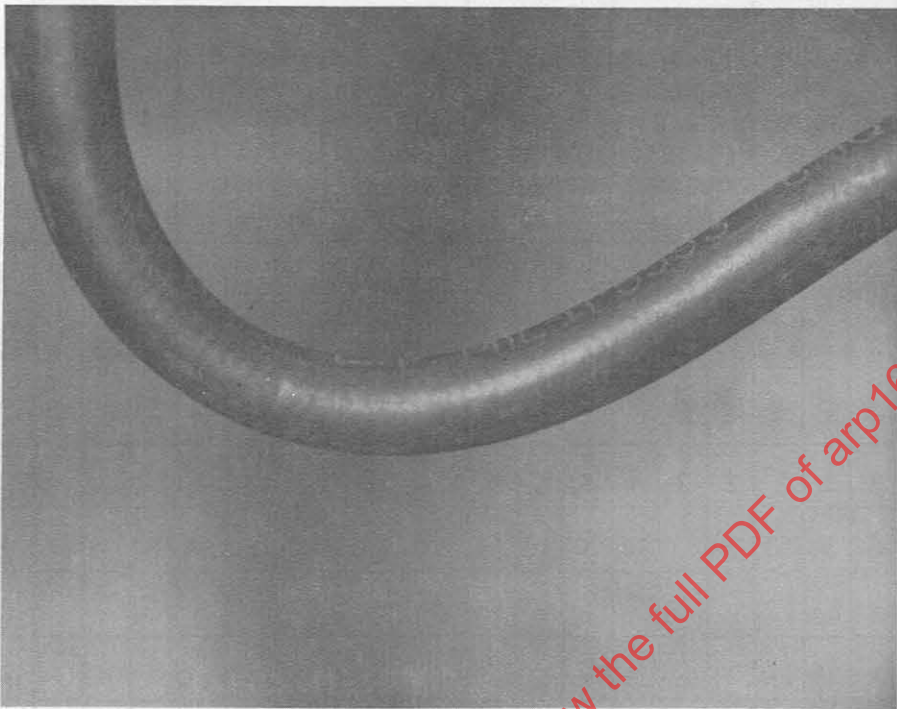


PLATE 1



PLATE 2

Kinked Assemblies - Minor and Major. Low Pressure Rubber Hose (MIL-H-5593).

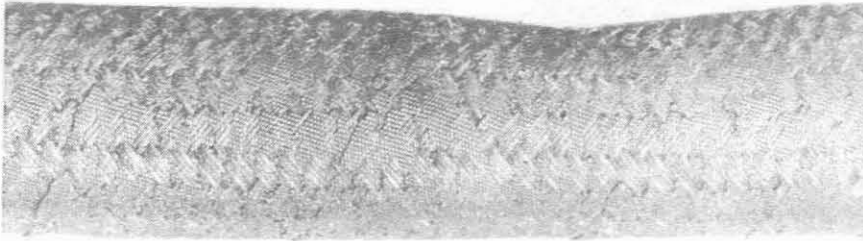


PLATE 3



PLATE 4

Kinked Assemblies - Minor and Major. Medium Pressure Rubber
Hose with Fabric Cover.

(MIL-H-8794C)

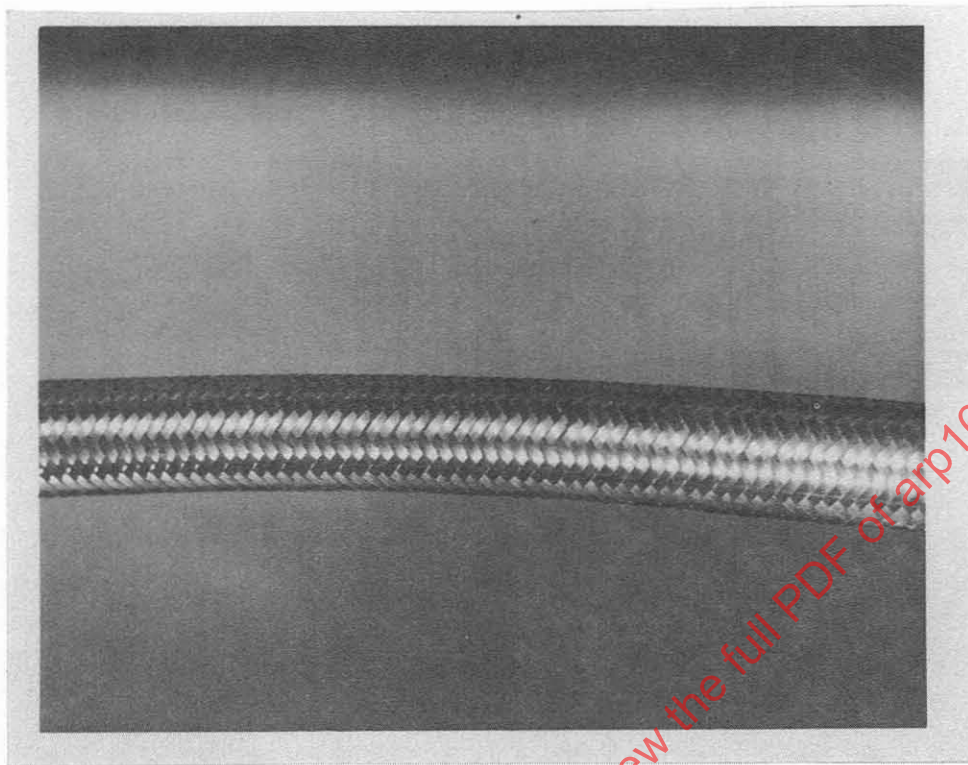


PLATE 5

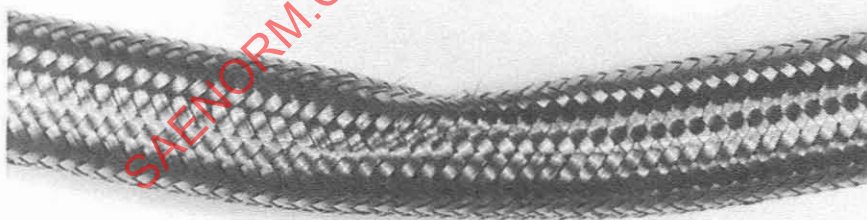


PLATE 6

Kinked Assemblies - Minor and Major. Medium Pressure Rubber
Hose with Stainless Steel Reinforcement
(Mil-H-83797).

PLATE 7

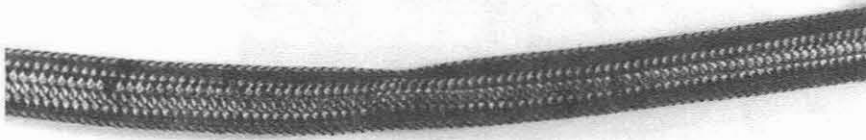
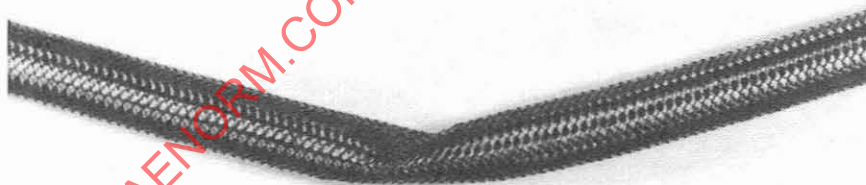


PLATE 8



Kinked Assemblies - Minor and Major. Low and Medium Pressure
Teflon Hose (MIL-H-25579/MIL-H-27267).

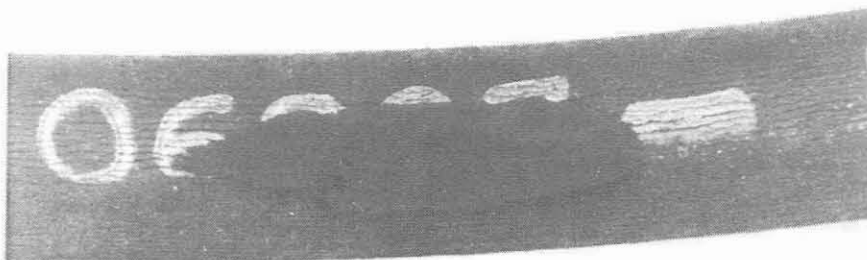


PLATE 9

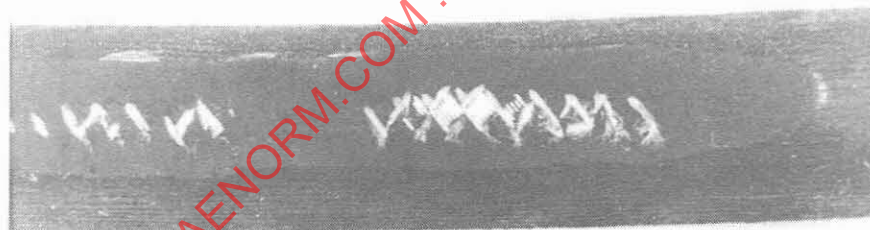


PLATE 10

Abrasion - Minor and Major. Low Pressure Rubber Hose
(MIL-H-5593).

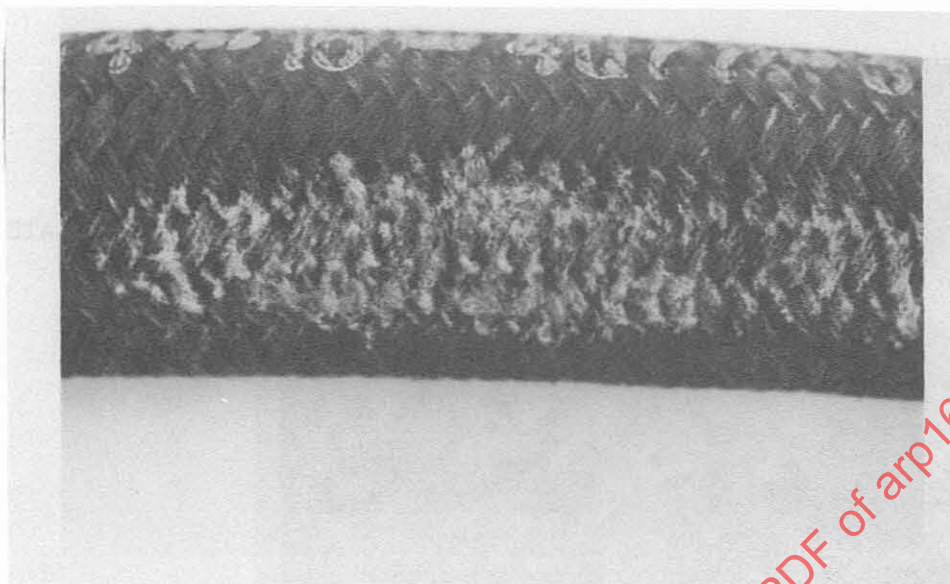


PLATE 11

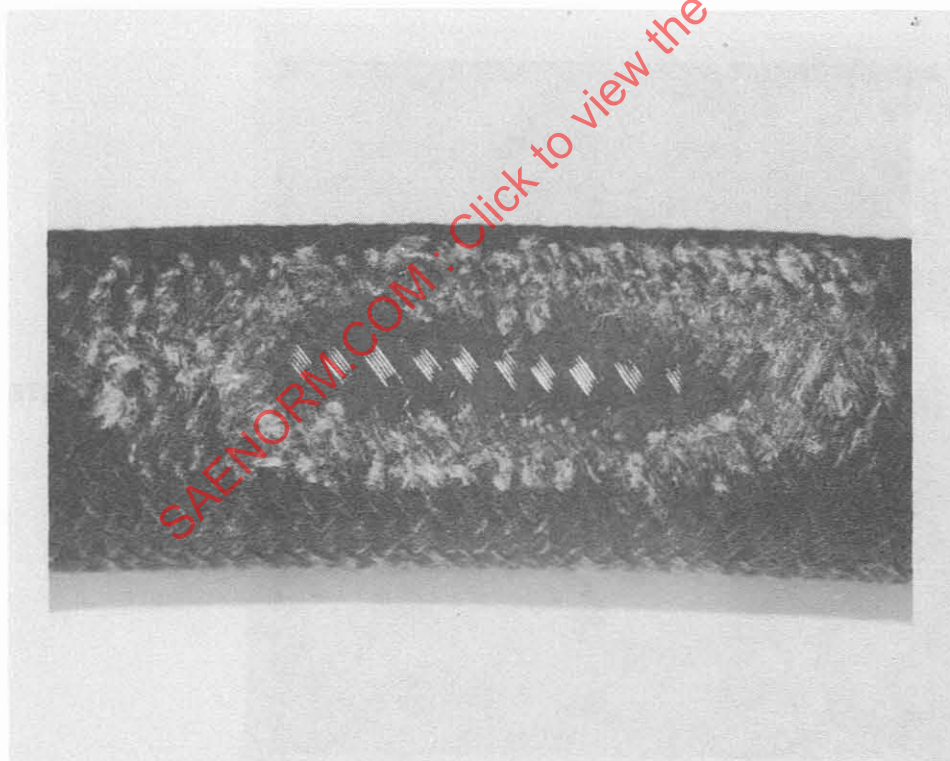


PLATE 12

Abrasion - Minor and Major. Medium Pressure Rubber Hose with Fabric Cover. (MIL-H-8794C).

PLATE 13

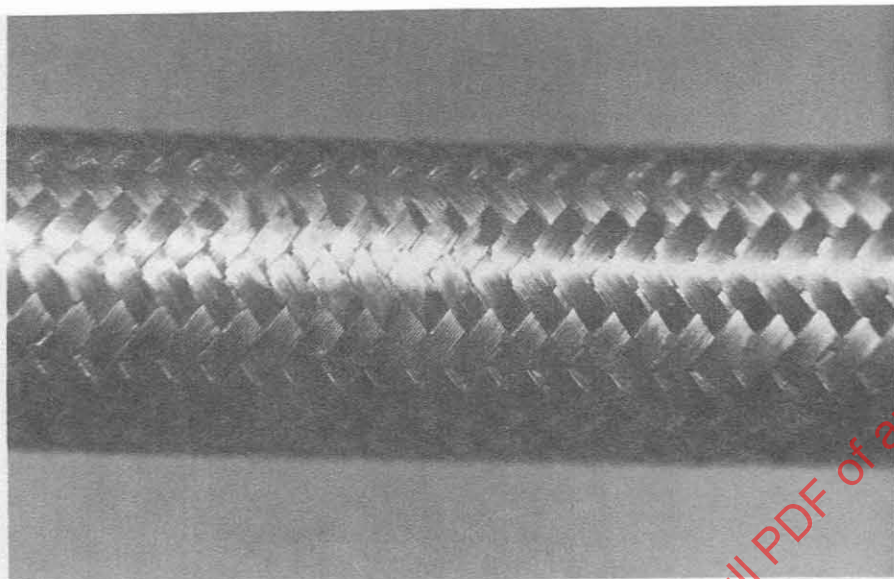
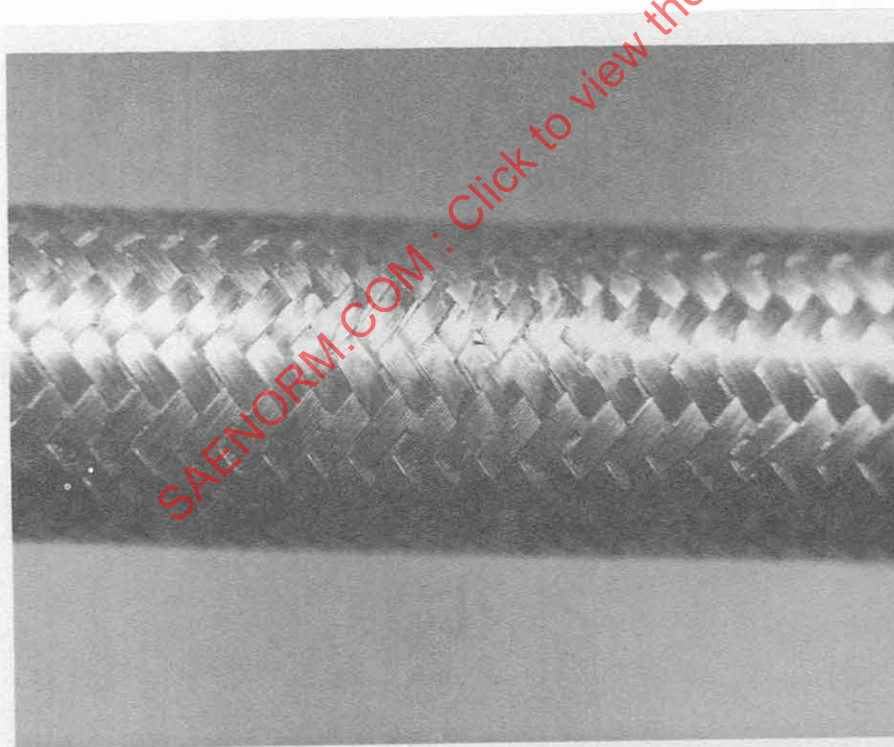


PLATE 14



Abrasion - Minor and Major. Medium Pressure Rubber Hose
with Stainless Steel Reinforcement.
(MIL-H-83797).

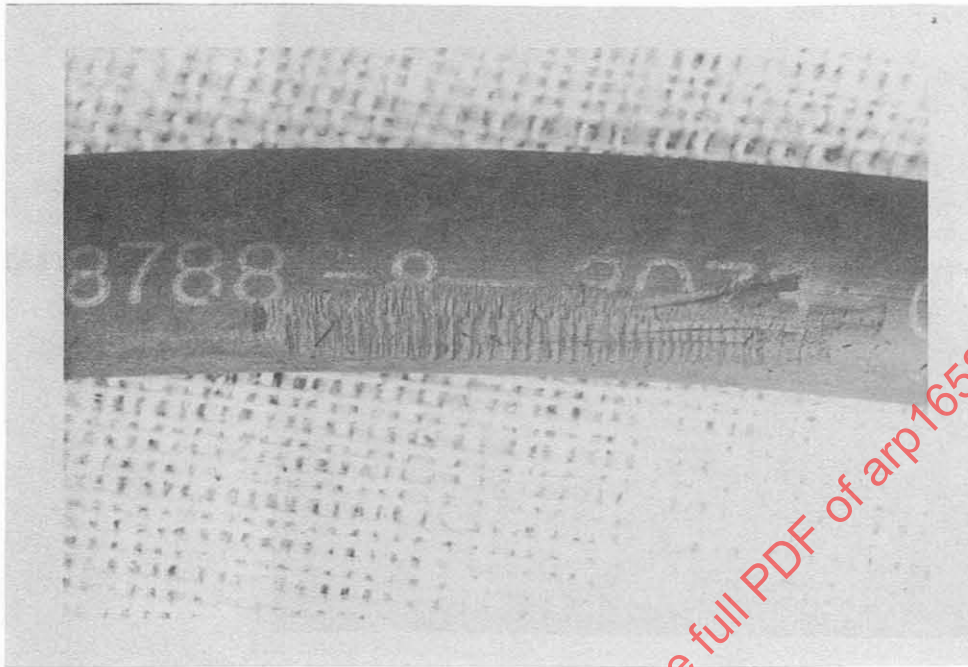


PLATE 15

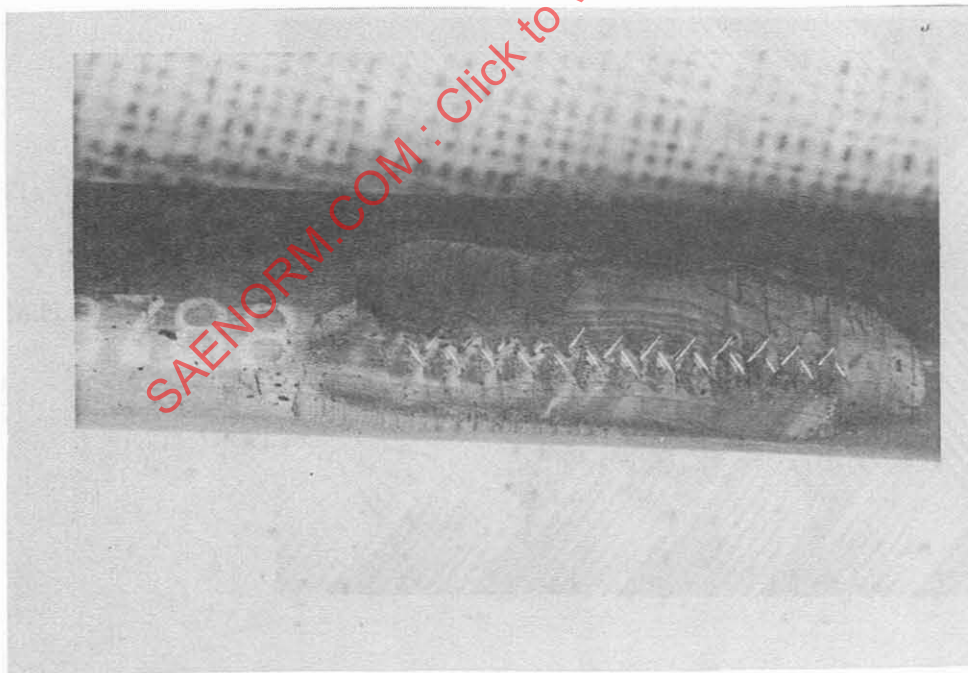


PLATE 16

Abrasion - Minor and Major. High Pressure Rubber Hose with Rubber Cover. (MIL-H-8788B).

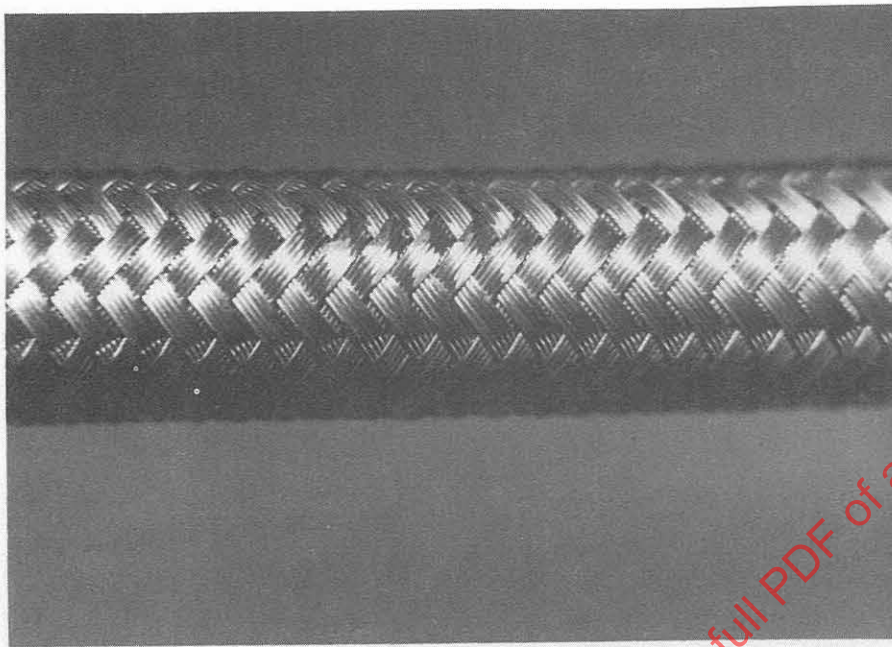


PLATE 17

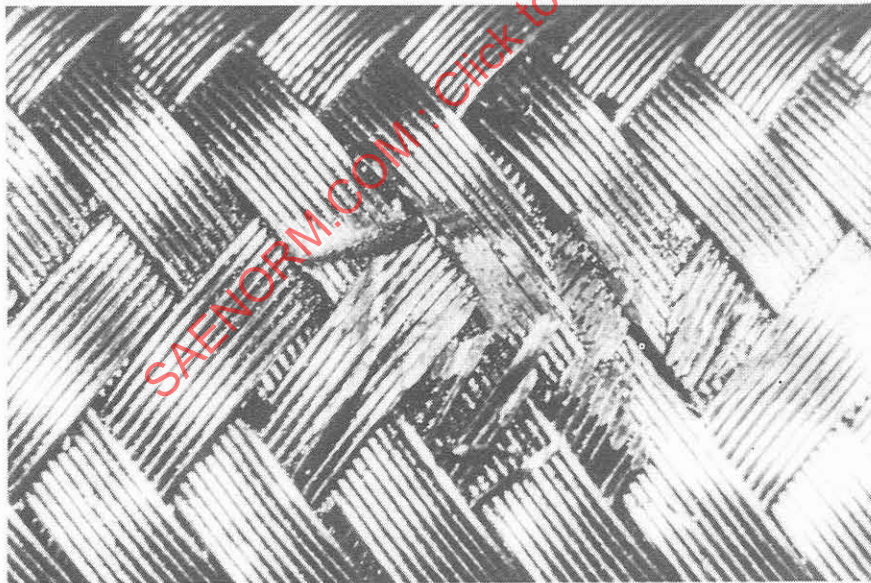


PLATE 18

Abrasion - Minor and Major. Low and Medium Pressure Teflon Hose.
(MIL-H-25579C/MIL-H-27267A).

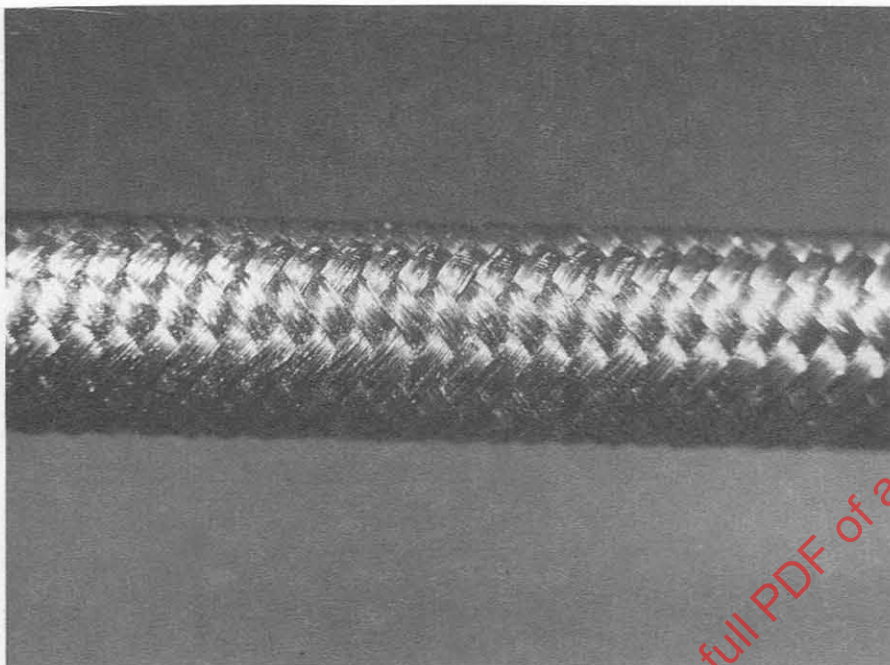


PLATE 19

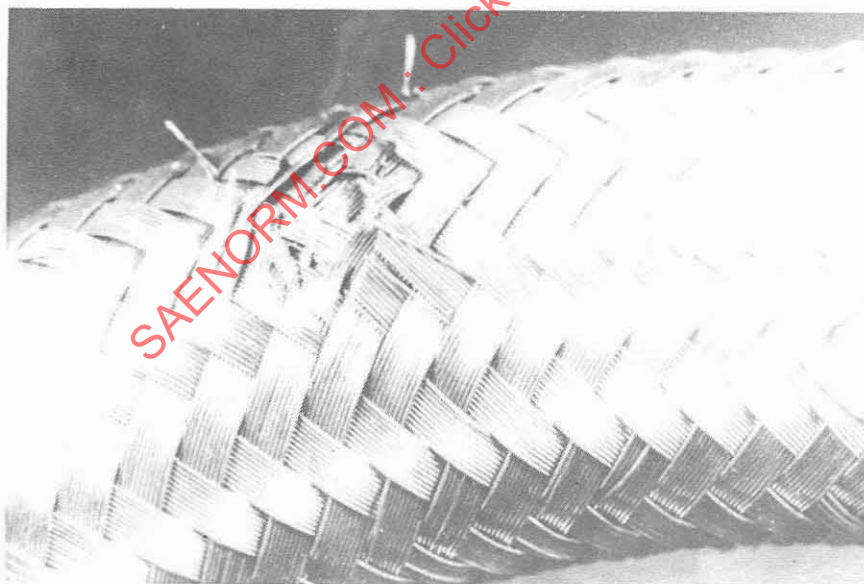


PLATE 20

Abrasion - Minor and Major. High Pressure Teflon Hose.
(MIL-H-38360).

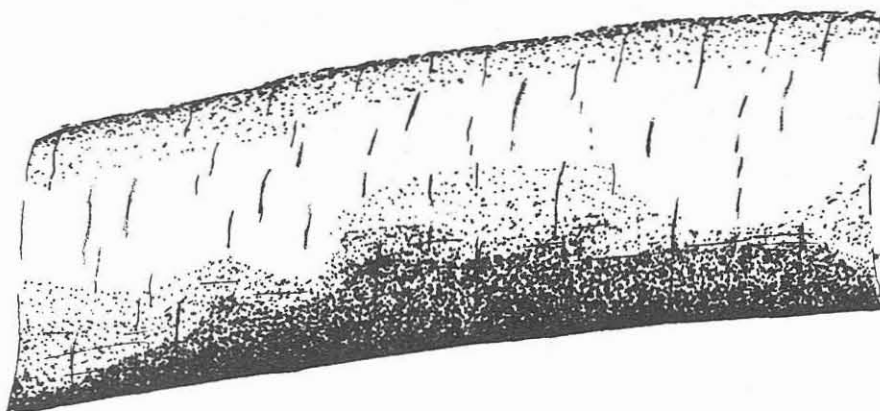


PLATE 21



PLATE 22

Weathering - Minor and Major. Low Pressure Rubber Hose.
(MIL-H-5593).

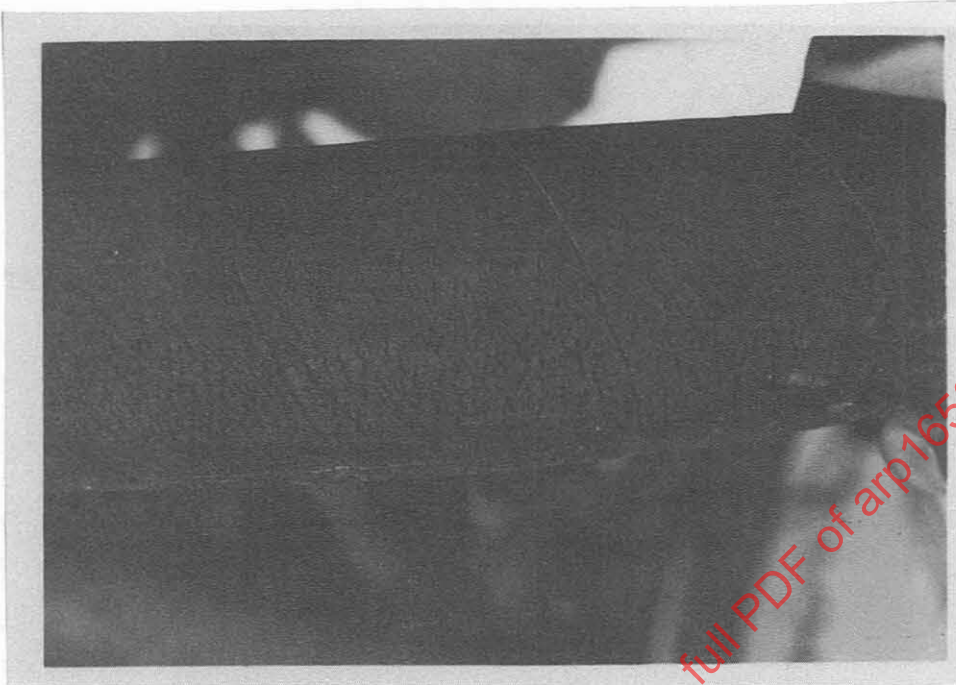


PLATE 23



PLATE 24

Weathering - Minor and Major. High Pressure Rubber Hose with Rubber Covering. (MIL-H-8788B).

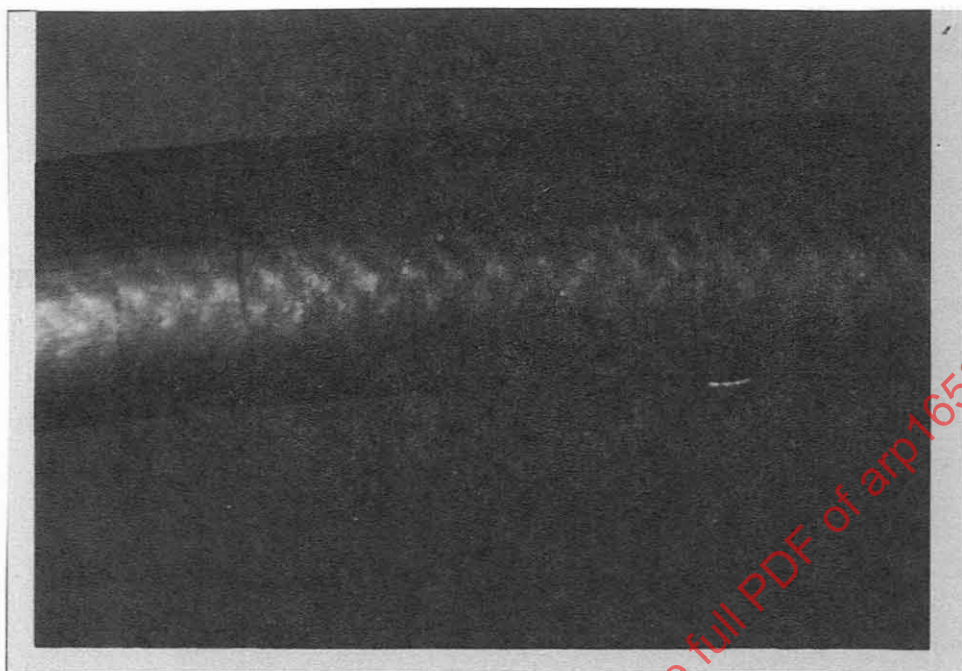


PLATE 25



PLATE 26

Heat Cracking - Minor and Major. Low Pressure Rubber Hose.
(MIL-H-5593).

Minor Leaker - Must be correctable to prevent further leakage. ie.(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.

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

Leaker - Minor and Major. Low Pressure Rubber Hose. (MIL-H-5593).

Minor Leaker - Must be correctable to prevent further leakage. ie.(tightening end fittings).

PLATE 29

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 30

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

Leaker - Minor and Major. Medium Pressure Rubber Hose with Fabric Cover. (MIL-H-8794C).

Minor Leaker - Must be correctable to prevent further leakage. ie.(tightening end fittings).

PLATE 31

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 32

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

Leaker - Minor and Major. Medium Pressure Rubber Hose with Stainless Steel Reinforcement. (MIL-H-83797).

Minor Leaker - Must be correctable to prevent further leakage. ie. (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)

Leaker - Minor and Major. High Pressure Rubber Hose with Rubber Cover. (MIL-H-8788B).

Minor Leaker - Must be correctable to prevent further leakage. ie.(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)

Leaker - Minor and Major. Low and Medium Pressure Teflon Hose. (MIL-H-25579C/MIL-H-27267A).

Minor Leaker - Must be correctable to prevent further leakage. ie.(tightening end fittings).

PLATE 37

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 38

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

Leaker - Minor and Major. High Pressure Teflon Hose. (MIL-H-38360).

Minor:

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

PLATE 39

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

Major:

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

PLATE 40

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

Leaker - Minor and Major. Fire Sleeved Hose.

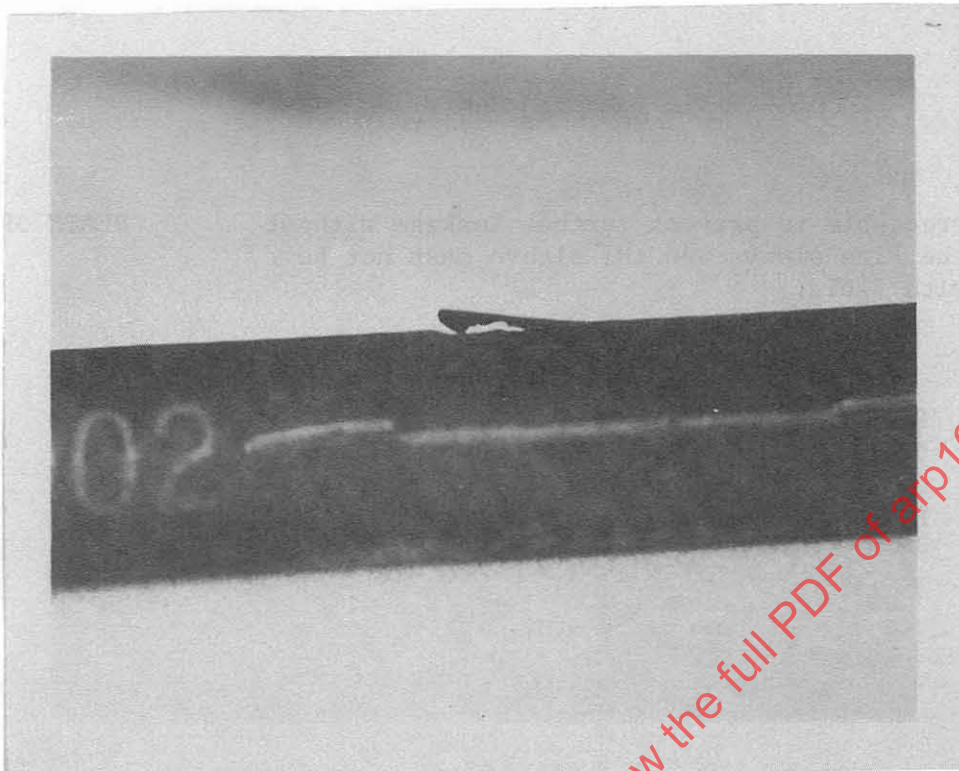


PLATE 41



PLATE 42

Tears - Minor and Major. Low Pressure Rubber Hose.
(MIL-H-5593).

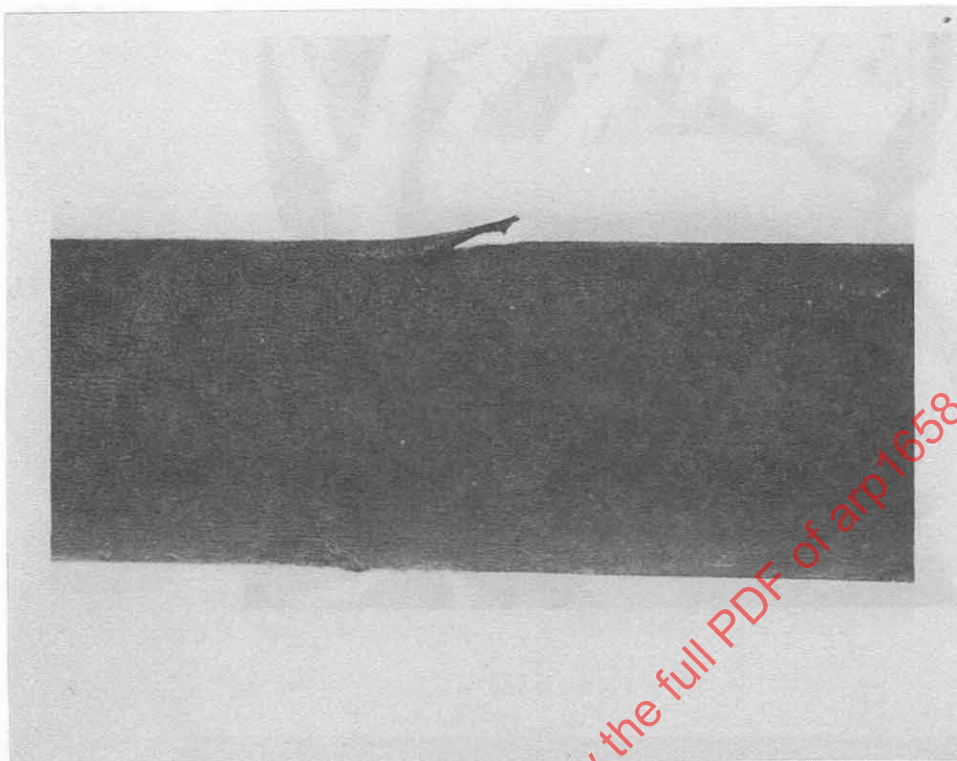


PLATE 43

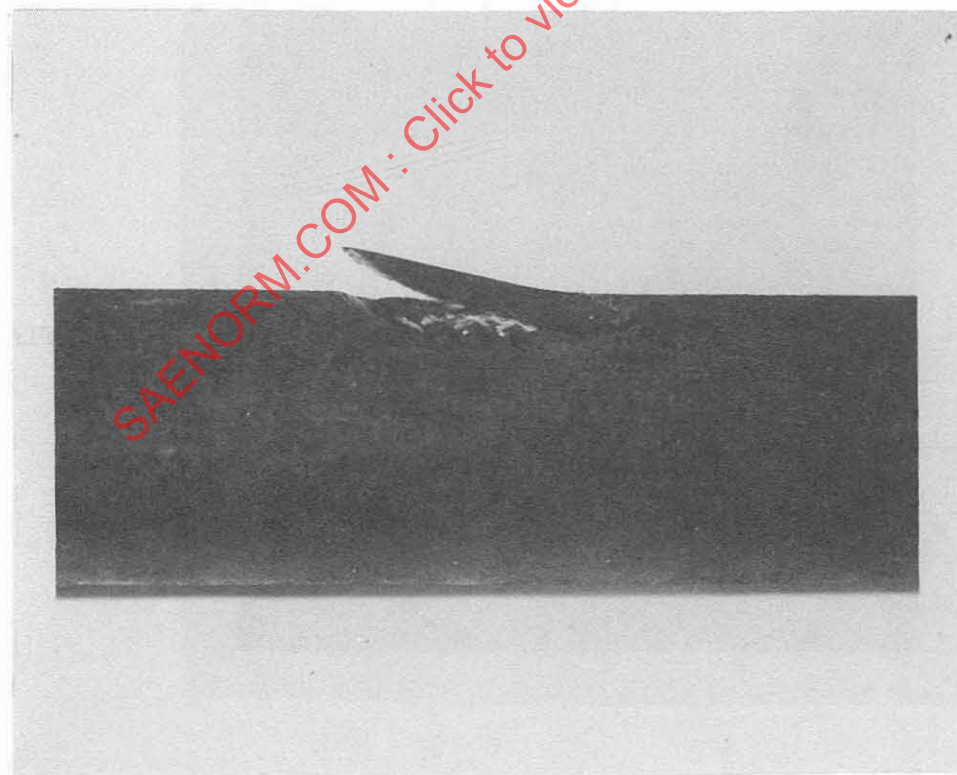


PLATE 44

Tears - Minor and Major. High Pressure Rubber Hose with
Rubber Covering. (MIL-H-8788B).

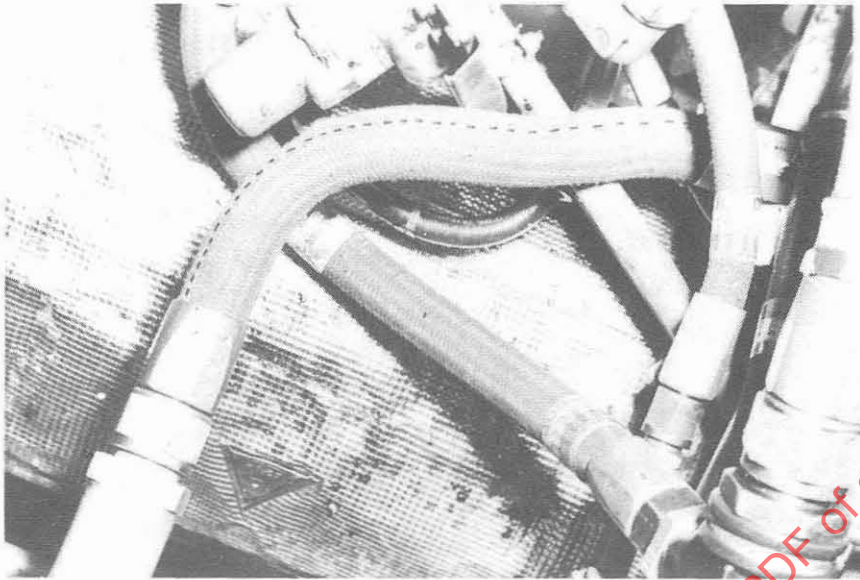


PLATE 45



PLATE 46

Twist - Minor and Major. Medium Pressure Rubber Hose with Fabric Cover. (MIL-H-8794C).

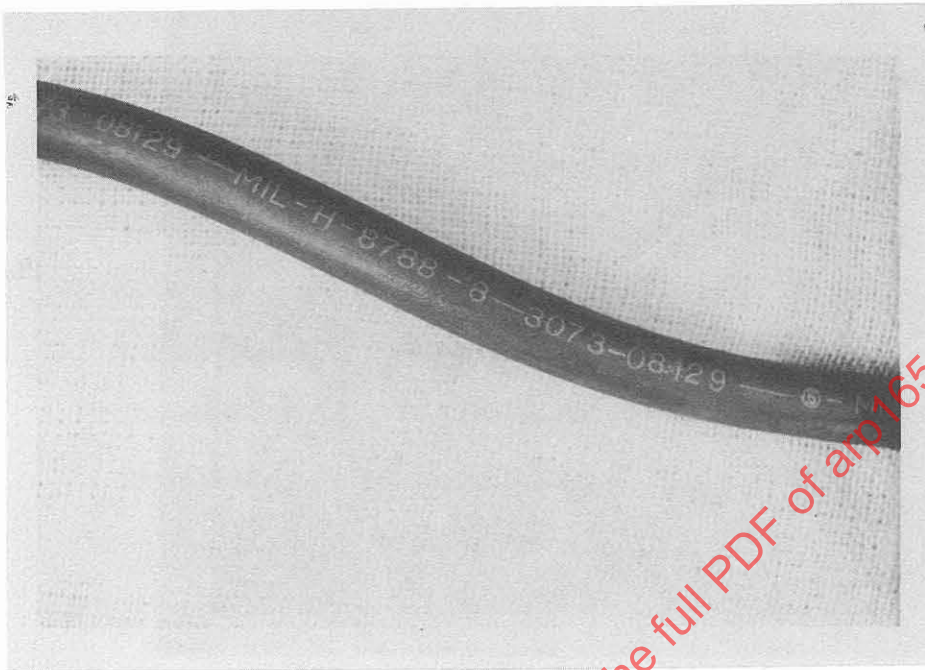


PLATE 47



PLATE 48

Twist - Minor and Major. High Pressure Rubber Hose with Rubber Cover. (MIL-H-8788B).

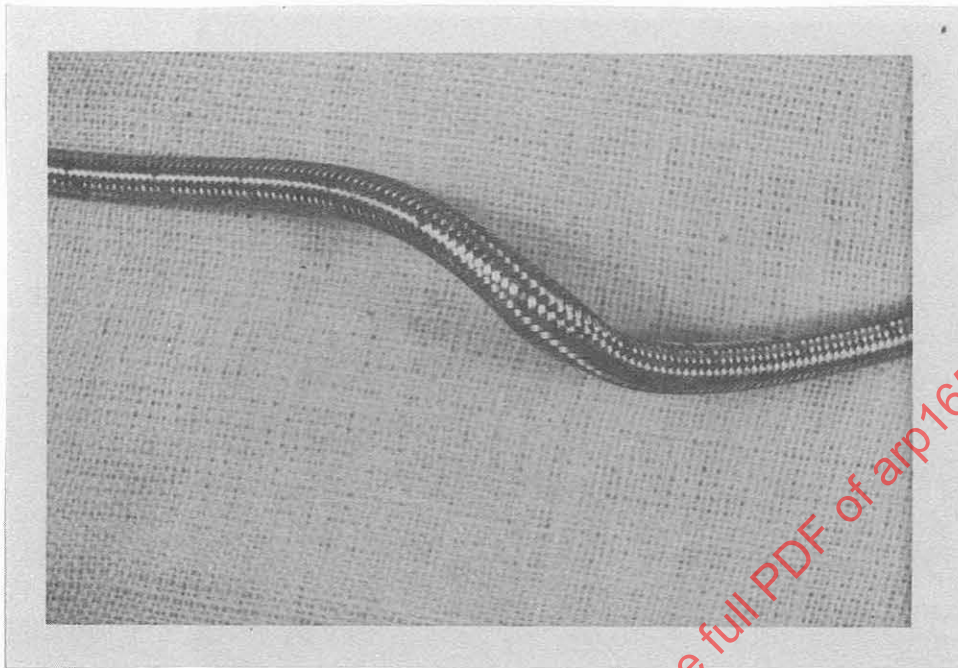


PLATE 49

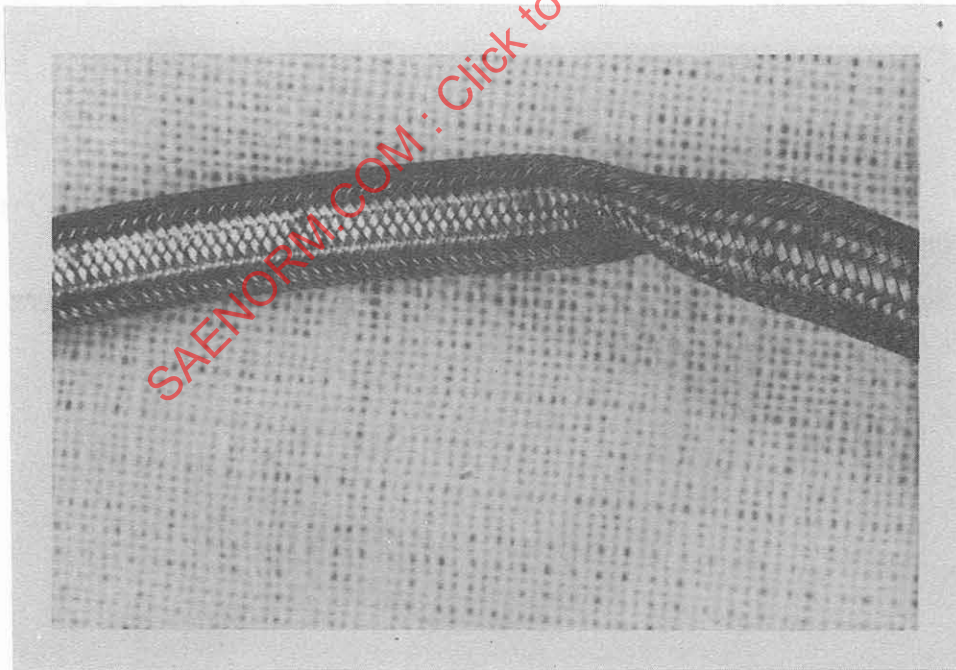


PLATE 50

Twist - Minor and Major. Low and Medium Pressure Teflon Hose.
(MIL-H-25579C/MIL-H-27267A).

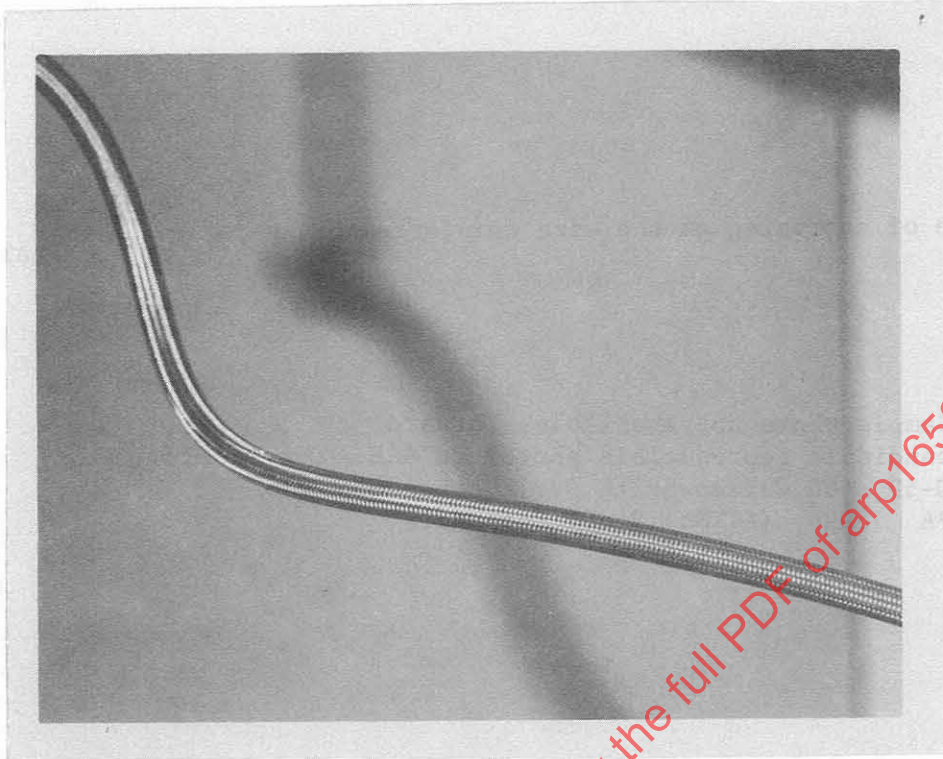


PLATE 51

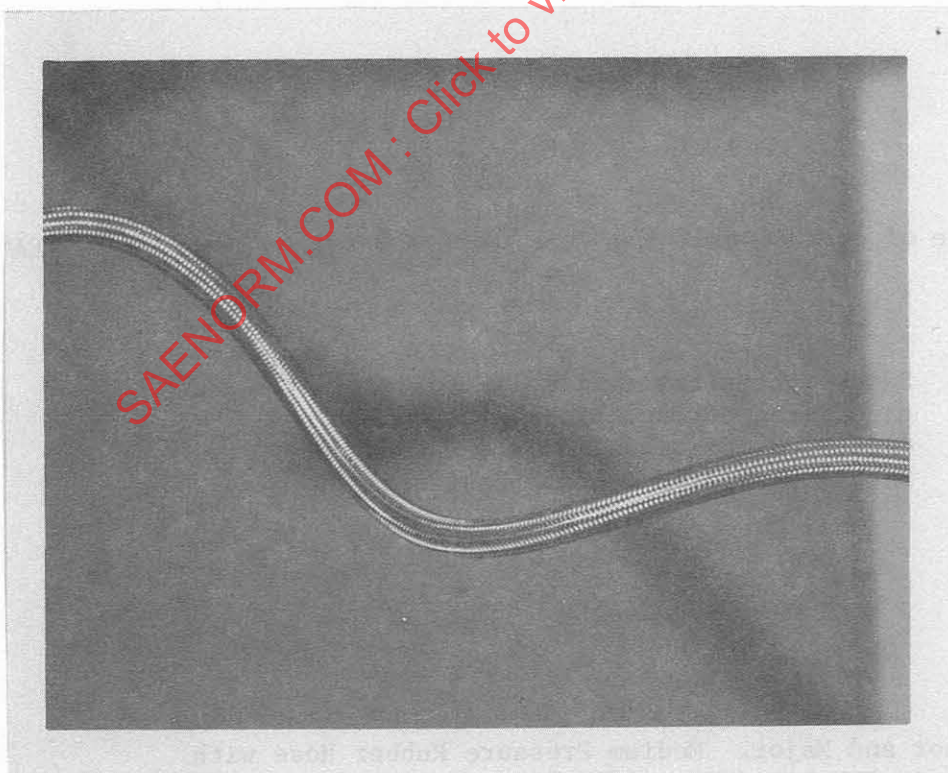


PLATE 52

Twist - Minor and Major. High Pressure Teflon Hose.
(MIL-H-38360).

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)

Corrosion - Minor and Major. Medium Pressure Rubber Hose with Fabric Cover. (MIL-H-8794C).

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

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.

PLATE 57

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 58

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

Corrosion - Minor and Major. High Pressure Rubber Hose with
Rubber Cover. (MIL-H-8788B).

Any evidence of corrosion of the wire reinforcement is minor.

PLATE 59

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



PLATE 60

Corrosion - Minor and Major. Low and Medium Pressure Teflon Hose.
(MIL-H-25579C/MIL-H-27267A).

Any evidence of corrosion of the wire reinforcement is minor.

PLATE 61

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



PLATE 62

Corrosion - Minor and Major. High Pressure Teflon Hose.
(MIL-H-38360).

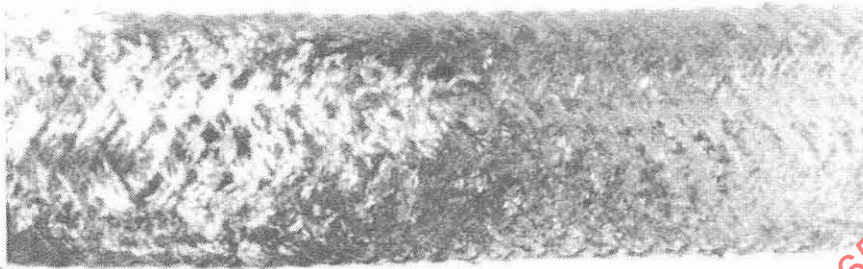


PLATE 63

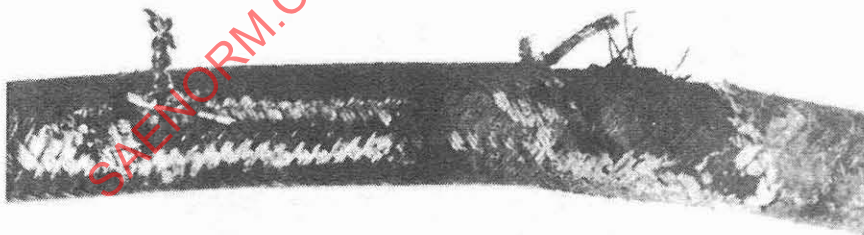


PLATE 64

Heat Damage - Minor and Major. Medium Pressure Rubber Hose
with Fabric Cover. (MIL-H-8794C).

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

PLATE 65

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

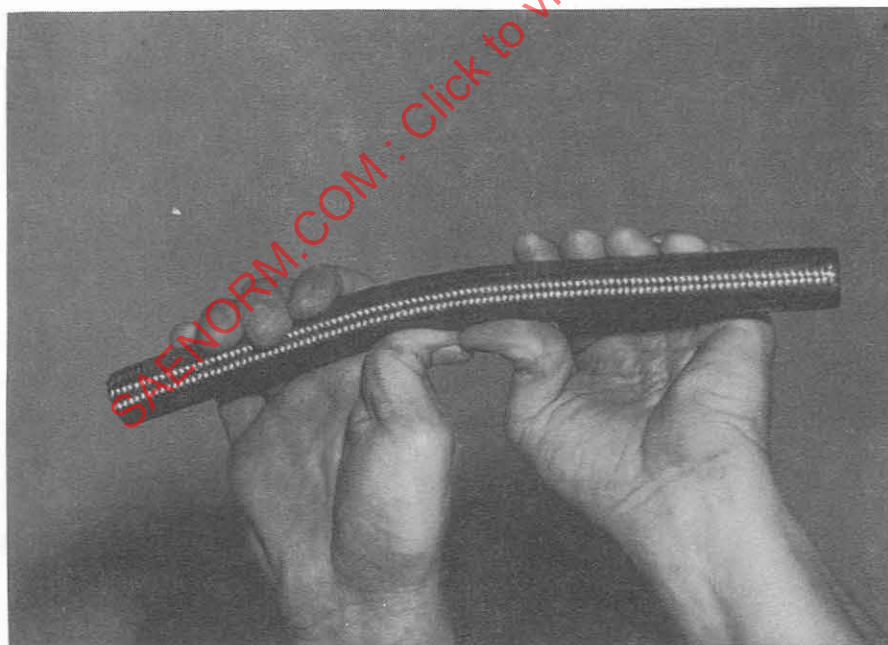


PLATE 66

Heat Damage - Minor and Major. Medium Pressure Rubber Hose with
Stainless Steel Reinforcement. (MIL-H-83797).



PLATE 67



PLATE 68

Heat Damage - Minor and Major. High Pressure Rubber Hose with Rubber Cover. (MIL-H-8788B).