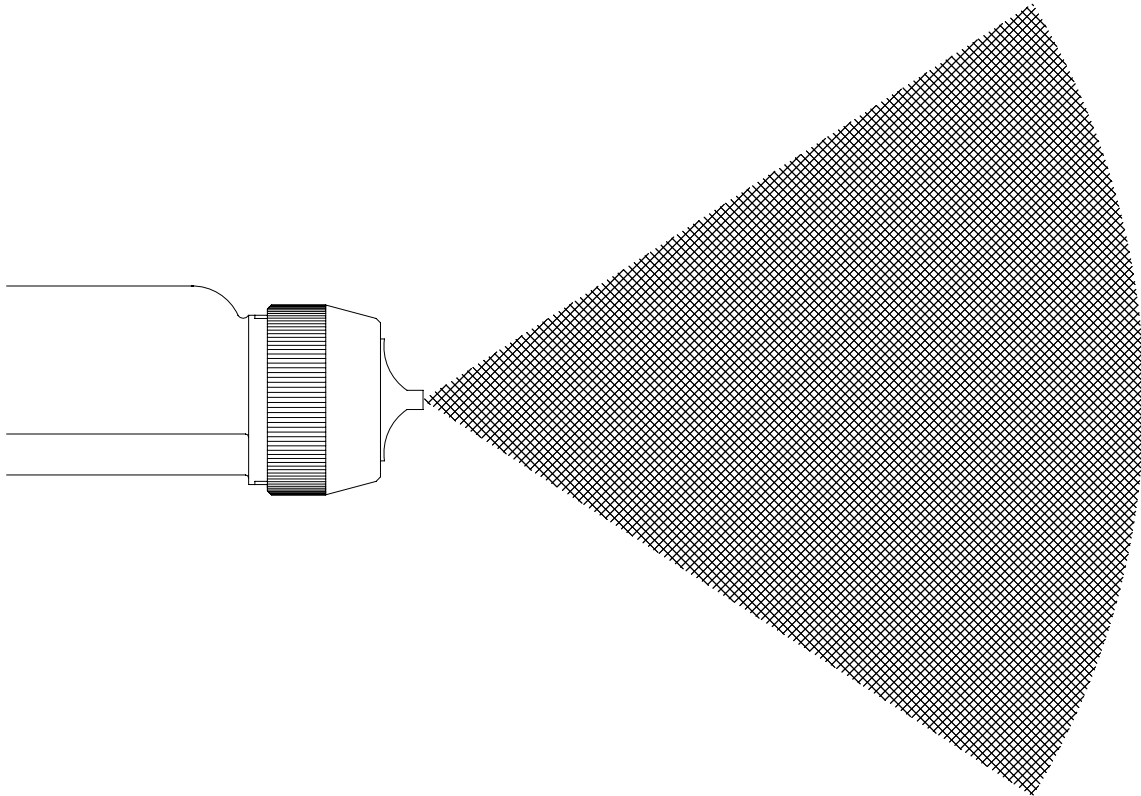


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## PAINT RELATED INFORMATION FOR REA™, REM™, and M90™ GUNS

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**IMPORTANT:** Before using this equipment, carefully read all instructions in this manual. Keep this Technical Manual for future reference.

Technical Manual Price: \$20.00 (U.S.)

**NOTE:** This manual has been changed from revision **IL-259-A** to revision **IL-259-B**. Reasons for this change are noted under “Manual Change Summary” inside the back cover of this manual.

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# PAINT FORMULATION FOR REA, REM, AND M90 GUNS

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ITW Ransburg's REA™ (Electrostatic Air) and REM™, and M90™ (Electrostatic Air Assisted/Airless) equipment can be operated satisfactorily, in most installations, using the same paint formulation used with the comparable non-electrostatic equipment. However, the user who wishes to experiment to improve performance may try the following three variations in the paint formulation:

## 1. Decrease Viscosity:

To do this, add more of the solvent normally used or replace the normal solvent in whole or part with a solvent having increased solvency.

With many higher viscosity or higher solids coatings, heat may be required or more desirable to reduce viscosity.

Paints of lower viscosity require less air or hydraulic atomizing force which reduces the forward velocity of the atomized paint. Lower velocity results in higher electrostatic efficiency and corresponding decrease in overspray loss.

The useful ranges of viscosity varies considerably for different coating materials and applications, depending on the various requirements of film thickness, hiding, texture, etc.

## 2. Increase Flowability:

This can be done by replacing all or part of the usual solvent with one having a slower evaporation rate. This permits the paint to flow out better, both on the front face of the part and on electrostatic wrap-around areas. Wrap-around generally tends to be slightly drier than paint which has been deposited on the front face. The effect of increased flowability can be illustrated by paints which will hide poorly at 1.2 to 1.5 mils total dry film thickness if they have not flowed out properly, versus the same paints which have very good hiding at .8 to 1.0 mil when they have been well-atomized and have good flowability.

In general, the degree of flowability which can be tolerated is governed by the other physical requirements of the application.

## 3. Increase Electrical Resistance:

The electrical resistance of paint and solvents can be measured with ITW Ransburg's Paint Resistance Tester (76652-03).

### NOTE

- ▶ Ransburg's Paint Testers only measure the bulk resistance of the coating material and will not indicate the conductivity of metallics or other conductive pigments.

### NOTE

- ▶ Water reducible coatings may be sprayed in the insulated versions of the REA™-III and REA™-90 ONLY.

<b>SOLVENTS LISTED IN ORDER OF INCREASING POLARITY*</b>	
(Below listed trade names are only indications of range. Equivalents may be used.)	
<b><u>Non and Low Polarity</u></b>	<b><u>Medium Polarity</u></b>
Mineral Spirits	Ethyl Acetate
Textile Spirits	Cyclohexanol (Hexalin)
VM&P Naptha	Butyl Carbitol (Dowanol19)
High Flash Naptha	Isophorone
SC-100	
SC-150	<b><u>High Polarity</u></b>
Heavy Aromatic Naptha-HAN	Methyl Ethyl Ketone
Xylol	Methyl Isobutyl Ketone
Toluol	Acetone
Trichlorethylene	Isopropyl Alcohol
Odorless Mineral Spirits	Methyl Cellosolve (Dowanol-EM)
n-Butyl Acetate	Diacetone Alcohol (Diacetone)
	Ethyl Alcohol
	Methyl Acetate (Metal-60)

\*Users should be aware of solvent restriction imposed in some areas. See your solvent supplier for details.

**Figure 1: Solvents Listed in Order of Increasing Polarity**

Figure 1 will aid in selection of solvents that will increase electrical resistance of the formulation.

ITW Ransburg's Bulletin TL-00-02 "Solvent Selection" covers solvent selection and recommended electrical resistance ranges for ITW Ransburg's No. 2 Process rotary atomizers, both automatic and manual equipment. These recommendations have been misinterpreted by many who are concerned with paint formulation for REA and REM guns. Bulletin TL-00-02 DOES NOT apply to this non-rotating equipment.

There are isolated cases where the use of a certain conductive solvent actually improved the performance of a given paint in REA and REM guns; however, this improvement resulted from decrease in viscosity and/or increase in flowability and not because of decrease in resistance. It is emphasized that this improvement was in spite of decreased resistance and not because of it.

If all other factors are held constant, the higher the paint resistance, the higher will be the efficiency when using the REA and REM guns. Therefore, when using Ransburg Paint Tester with REA and REM equipment, efforts to increase paint resistance, while still maintaining the same quality of atomization and flow, will yield maximum paint transfer efficiency.

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# THE USE OF METALLIC PAINTS WITH REA, REM, AND M90 GUNS

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## WARNING

► Some highly conductive metallic paint may be sprayed in fluid supplies of REA style guns with the use of a coiled fluid tube (75228-XX) or Shortstopper™ (77821-XX or 77822-XX). REA guns should **NEVER** spray solvent base materials in an insulated waterborne configuration.

The electrical characteristics of paint formulations used in REA systems are necessarily of interest and are critical to gun performance.

When using the Paint Resistance Tester with metallic paints, the low voltage battery of the test probe may not influence the metal particles, therefore, their presence may go unrecognized by the meter. When such formulations are placed in electrostatic units and high voltage applied, the metal particles may become aligned by the electrical field. This may result in an appreciable flow of current to ground by way of the paint system. While the flow of current causes no immediate dangerous condition, it may drain some or all the high voltage from the electrode and reduce or eliminate electrostatic efficiency.

Since the Paint Resistance Tester is unable to predict this condition, alternate methods must be employed to determine the suitability of such coatings for use in electrostatic equipment. The method recommended is essentially to place the coating in a operating unit and measure the current flow to ground. This flow is most conveniently measured by the current demand test, detailed later.

A sustained period of excessive or maximum current demand, such as when using a highly conductive paint, may cause permanent damage to the equipment. This damage may lead to unsafe operating conditions and require the gun to be repaired.

The tolerable quantity of metal particles in a paint formulation has often been expressed by two rules of thumb:

1. A maximum of 4 (weight) ounces (1/4 lb.) per gallon paint (4.8 ounces per Imperial gallon).
2. 3% metal particles by weight.

## NOTE

► Certain variations in fluid inlet tube design may enhance the sprayability of high solids metallics. These options or variations are available from Ransburg Distributors. All paints, however, should be subjected to individual testing to establish specific working parameters.

Although these two rules are valid in most cases, caution should be used in applying any rule of thumb to a specific situation. There are many instances where amounts greater than these have worked satisfactorily, while small amounts have not worked at all.

<b>METALLIC COATING WORKING CHARACTERISTICS</b>		
<u>More Likely to Work</u>	<u>Characteristics</u>	<u>Less Likely to Work</u>
Lower	Metallic Content	Higher
Non-leafing	Metallic Content	Leafing
Finer	Metallic Particle Size	Coarser
Higher	Flow Rate	Lower
More	Conductive Solvent*	Less
Higher	% of Non-Metallic Pigments	Lower

\*There is no guarantee that a higher percentage of conductive solvents will produce a positive benefit in every case.

**Figure 2: Metallic Coating Working Characteristics**

Figure 2 lists a few of the factors that influence metallic coatings. The column at the left indicates those factors that are more likely to improve the paints electrical characteristics, while those at the right are less likely to work.

Even though a certain coating has been proven satisfactory for use in REA guns, additional steps are necessary:

1. The system may require periodic flushing with clean solvent (daily as required).
2. The coating should not be allowed to remain in the system overnight or during long shutdowns.
3. Frequent (daily) current demand tests should be performed for the first few weeks of operation. When the system has proven satisfactory, and no undesired readings have been obtained, the test can be reduced to once a week or less.

## CURRENT DEMAND TEST FOR HIGH VOLTAGE POWER SUPPLIES / CLASSIC STYLE GUNS (REA-III, REA-IV, REM, and M90)

### (Reference Figure 3)

Prior to performing a current demand test, the system should be tested to ensure that short circuit current is within proper limits. Refer to the appropriate service manual for details on performing the Short Circuit Current (SCI) Test.

A current demand test is performed by placing the paint to be used into an operating system, holding the gun a minimum of three feet (arms length) from any grounded object, pulling the trigger, and observing the meter. The reading obtained depends on the condition of the gun, condition of the electrical system, and the PAINT ELECTRICAL RESISTANCE.

A current demand test will have one of two possible results: a normal current demand reading of 0-90 (75 for REM & M90 Classic units) microamperes or an excessive reading of over 90 microamperes. A normal reading of 0 to 90 (75 for REM & M90 Classic units) microamperes, indicates the paint resistance is within the approved range.

A reading in excess of 90 (75 for REM & M90 Classic units) microamperes indicates that either the paint conductivity is too high or the gun is defective. Flush the system with solvent to remove the metallic paint. Blow the fluid line dry with compressed air. Repeat the current demand test with the gun empty. If the reading is now normal (0 to 60 microamperes) the paint is too conductive and should not be used in the system. If a high reading is obtained, the gun is defective and must be repaired.

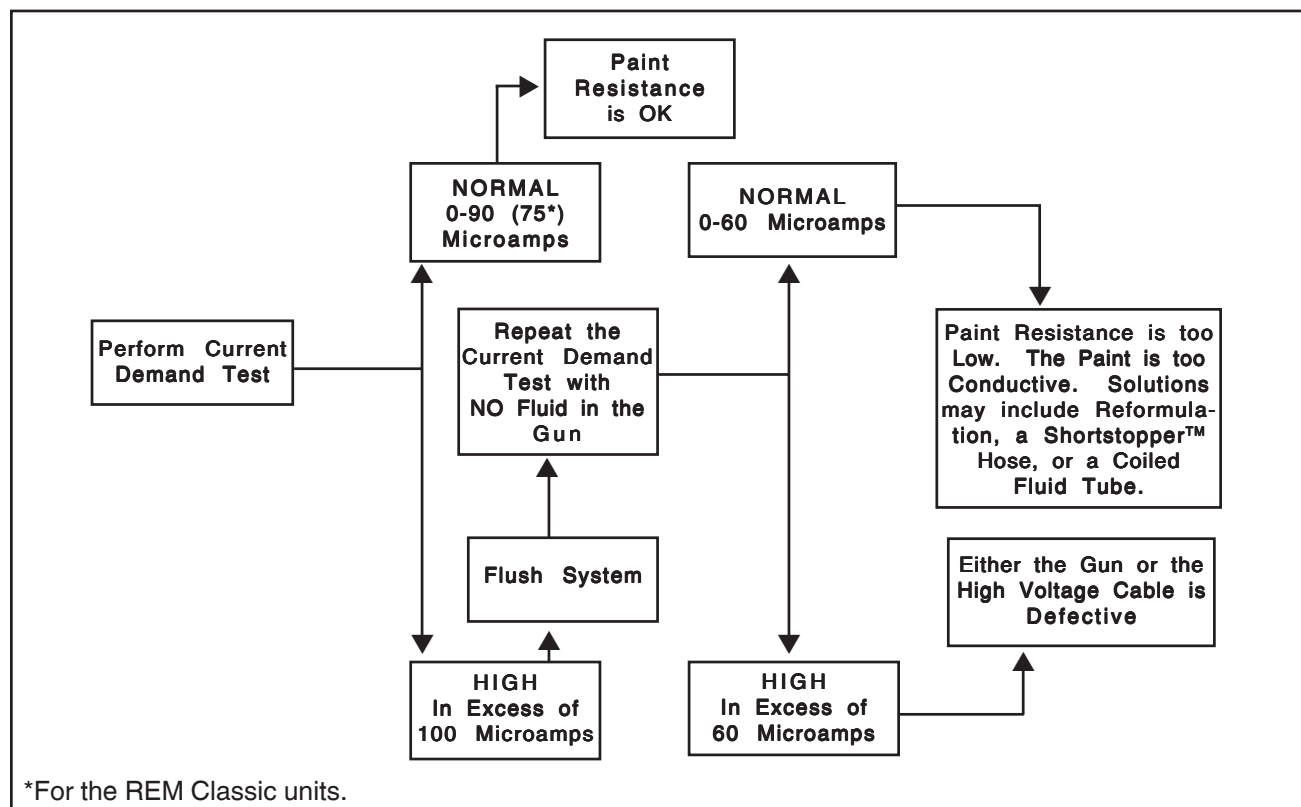


Figure 3: High Voltage Supplies



## CURRENT DEMAND TEST FOR LOW VOLTAGE CONTROL UNITS / CASCADE STYLE GUNS (REA-70, REM, M90, REA-90, and REA-9000)

### (Reference Figure 4)

Due to differences in circuit design and function of cascade style guns, standard current demand, and short circuit current (SCI) test will not work. (See Figure 4 for appropriate procedure.)

## FLUID LINES FOR METALLIC OR LOW RESISTANCE COATINGS (REA Type Guns Only)

In some cases as a means of reducing current draw to enable the use of metallic and some low resistance coatings in REA type guns, a smaller or reduced I.D. fluid tube or a coiled fluid tube may be used. A similar device called the Shortstopper may also be employed. In this instance, ground shielded tubing is used uncoiled. By reducing the fluid tube inside diameter, the following actions occur:

1. The decreased size of the fluid tube increases the velocity of the material, thereby reducing the possibility of the metallic particles shorting to ground.
2. The decreased inside diameter increases the resistance to electrical flow, thereby reducing current draw.

These methods have proven successful in most installations, however, it is recommended that testing be done with each individual coating material to ensure the best performance.

Contact your ITW Ransburg distributor for the current part number or latest techniques.

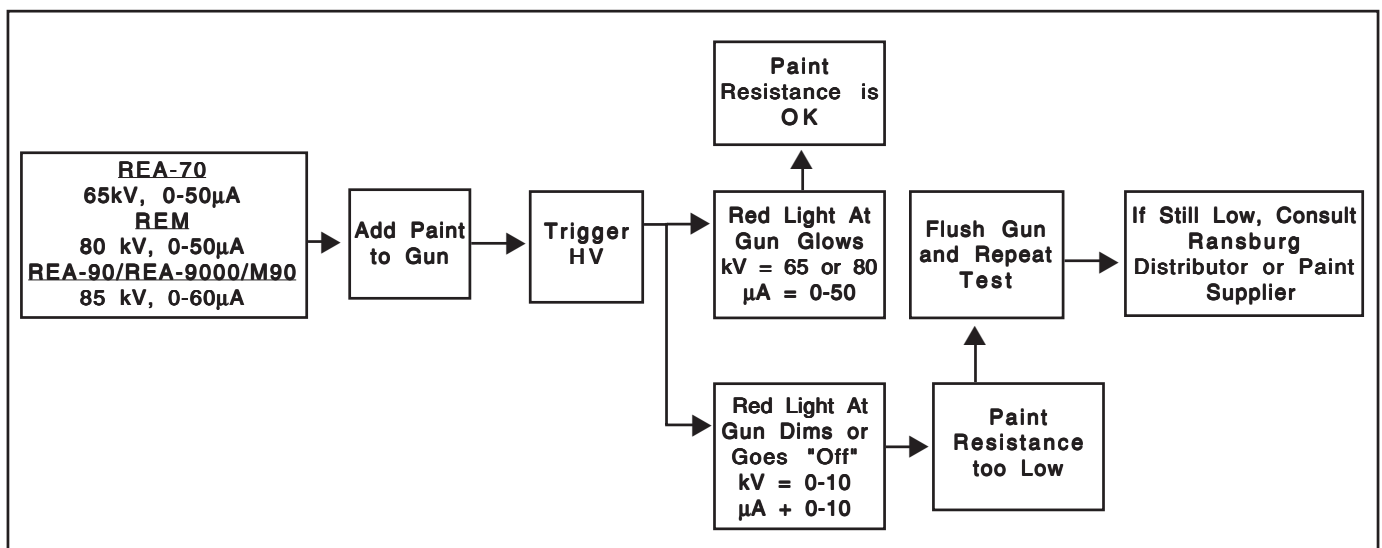


Figure 4: Low Voltage Control Unit (Cascade Style)

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# WARRANTY POLICIES

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## LIMITED WARRANTY

ITW Ransburg will replace or repair without charge any part and/or equipment that falls within the specified time (see below) because of faulty workmanship or material, provided that the equipment has been used and maintained in accordance with ITW Ransburg's written safety and operating instructions, and has been used under normal operating conditions. Normal wear items are excluded.

**THE USE OF OTHER THAN ITW RANSBURG APPROVED PARTS, VOID ALL WARRANTIES.**

**SPARE PARTS:** One hundred and eighty (180) days from date of purchase, except for rebuilt parts (any part number ending in "R") for which the warranty period is ninety (90) days.

**EQUIPMENT:** When purchased as a complete unit, (i.e., guns, power supplies, control units, etc.), is one (1) year from date of purchase. **WRAPPING THE APPLICATOR, ASSOCIATED VALVES AND TUBING, AND SUPPORTING HARDWARE IN PLASTIC, SHRINK-WRAP, OR ANY OTHER NON-APPROVED COVERING, WILL VOID THIS WARRANTY.**

**ITW RANSBURG'S ONLY OBLIGATION UNDER THIS WARRANTY IS TO REPLACE PARTS THAT HAVE FAILED BECAUSE OF FAULTY WORKMANSHIP OR MATERIALS. THERE ARE NO IMPLIED WARRANTIES NOR WARRANTIES OF EITHER MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ITW RANSBURG ASSUMES NO LIABILITY FOR INJURY, DAMAGE TO PROPERTY OR FOR CONSEQUENTIAL DAMAGES FOR LOSS OF GOODWILL OR PRODUCTION OR INCOME, WHICH RESULT FROM USE OR MISUSE OF THE EQUIPMENT BY PURCHASER OR OTHERS.**

### EXCLUSIONS:

If, in ITW Ransburg's opinion the warranty item in question, or other items damaged by this part was improperly installed, operated or maintained, ITW Ransburg will assume no responsibility for repair or replacement of the item or items. The purchaser, therefore will assume all responsibility for any cost of repair or replacement and service related costs if applicable.

# APPENDIX

## PAINT AND SOLVENT SPECIFICATIONS

	REA™ / EFM™ EVOLVER™	REM™ / M90™	NO. 2 HAND GUN	TURBODISK™	AEROBELL® II*** AEROBELL® AEROBELL® 33 RMA-101™
RECOMMENDED VISCOSITY USING A ZAHN NO. 2	18 TO 30 SEC	18 TO 30 SEC	20 TO 60 SEC	20 TO 60 SEC	20 TO 60 SEC
PAINT ELECTRICAL RESISTANCE**	.1 MΩ TO ∞	.1 MΩ TO ∞	.1 TO 1 MΩ	.1 MΩ TO ∞	.1 MΩ TO ∞
RECOMMENDED DELIVERY (UPTO)	1000 cc/min	1500 cc/min	180 cc/min	1000 cc/min	500 cc/min

### GUIDE TO USABLE SOLVENT SELECTION

Chemical Name	Common Name	Category	Flash Point†† (TCC)	*CAS Number	Evap. Rate†	Elec. Res.**
DICHLOROMETHANE	Methylene Chloride	Chlorinated Solvents		75-09-2	14.5	HIGH
VM & P NAPHTHA	Naptha	Aliphatic Hydrocarbons	65°F	8030-30-6	10	HIGH
ACETONE		Ketones	-18°F	67-64-1	5.6	LOW
METHYL ACETATE		Esters	90°F	79-20-9	5.3	LOW
BENZENE		Aromatic Hydrocarbons	12°F	71-43-2	5.1	HIGH
ETHYL ACETATE		Esters	24°F	141-78-6	3.9	MEDIUM
2-BUTANONE	MEK	Ketones	16°F	78-93-3	3.8	MEDIUM
ISO-PROPYL ACETATE		Esters	35°F	108-21-4	3.4	LOW
ISOPROPYL ALCOHOL	IPA	Alcohols	53°F	67-63-0	2.5	LOW
2-PENTANONE	MPK	Ketones	104°F	107-87-9	2.5	MEDIUM
METHANOL	Methyl Alcohol	Alcohols	50°F	67-56-1	2.1	LOW
PROPYL ACETATE	n-Propyl Acetate	Esters	55°F	109-60-4	2.1	LOW
TOLUOL	Toluene	Aromatic Hydrocarbons	48°F	108-88-3	1.9	HIGH
METHYL ISOBUTYL KETONE	MIBK	Ketones	60°F	108-10-1	1.6	MEDIUM
ISOBUTYL ACETATE		Esters	69°F	110-19-0	1.5	LOW
ETHANOL	Ethyl Alcohol	Alcohols		64-17-5	1.4	LOW
<b>BUTYL ACETATE</b>		<b>Esters</b>	<b>78°F</b>	<b>123-86-4</b>	<b>1.0</b>	<b>LOW</b>
ETHYLBENZENE		Aromatic Hydrocarbons	64°F	100-41-4	.89	HIGH
1-PROPANOL	n-Propyl Alcohol	Alcohols	74°F	71-23-8	.86	LOW
2-BUTANOL	sec.-Butyl Alcohol	Alcohols	72°F	78-92-2	.81	LOW
XYLOL	Xylene	Aromatic Hydrocarbons	79°F	1330-02-07	.80	HIGH
AMYLACETATE		Esters	106°F	628-63-7	.67	MEDIUM
2-METHYLPROPANOL	iso-Butyl Alcohol	Alcohols	82°F	78-83-1	.62	LOW
METHYL AMYL ACETATE		Esters	96°F	108-84-9	.50	LOW
5-METHYL-2-HEXANONE	MIAK	Ketones	96°F	110-12-3	.50	MEDIUM
1-BUTANOL	n-Butyl Alcohol	Alcohols	95°F	71-36-3	.43	LOW
2-ETHOXYETHANOL		Glycol Ethers	164°F	110-80-5	.38	LOW
2-HEPTANONE	MAK	Ketones	102°F	110-43-0	.40	MEDIUM
CYCLOHEXANONE		Ketones	111°F	108-94-1	.29	MEDIUM
AROMATIC-100	SC#100	Aromatic Hydrocarbons	111°F		.20	HIGH
DIISOBUTYL KETONE	DIBK	Ketones	120°F	108-83-8	.19	MEDIUM
1-PENTANOL	Amyl Alcohol	Alcohols		71-41-0	.15	LOW
DIACETONE ALCOHOL		Ketones	133°F	123-42-2	.12	LOW
2-BUTOXYETHANOL	Butyl Cellosolve	Glycol Ethers	154°F	111-76-2	.07	LOW
CYCLOHEXANOL		Alcohols	111°F	108-93-0	.05	LOW
AROMATIC-150	SC#150	Aromatic Hydrocarbons	149°F		.004	HIGH
AROMATIC-200		Aromatic Hydrocarbons	203°F		.003	HIGH

\* CAS Number: Chemical Abstract Service Number.

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\*\* Electrical Resistance using the ITW Ransburg Meter.

\*\*\* Solvent Base Configuration Only.

† Information Obtained From: <http://solvdb.ncms.org>

†† The lowest temperature at which a volatile fluid will ignite.

**Evaporation Rate is Based Upon Butyl Acetate Having a Rate of 1.0**

NOTE: Chart provides resistance and control information that we feel is necessary when using ITW Ransburg equipment.

VISCOSITY CONVERSION CHART																		
Poise	Centipoise	DuPont Parlin 7	DuPont Parlin 10	Fisher 1	Fisher 2	Ford Cup 3	Ford Cup 4	Gardner - Holdt Bubble	Gardner - Lithographic	Krebs Unit KU	Saybolt Universal SSU	Zahn 1	Zahn 2	Zahn 3	Zahn 4	Zahn 5	Sears Craftsman Cup	Din Cup 4
.1	10	27	11	20			5	A-4			60	30	16					10
.15	15	30	12	25			8	A-3			80	34	17					11
.2	20	32	13	30	15	12	10				100	37	18					12
.25	25	37	14	35	17	15	12	A-2			130	41	19					13
.3	30	43	15	39	18	19	14	A-1			160	44	20					14
.4	40	50	16	50	21	25	18	A			210	52	22				19	15
.5	50	57	17		24	29	22			30	260	60	24				20	16
.6	60	64	18		29	33	25	B		33	320	68	27				21	18
.7	70		20		33	36	28			35	370		30				23	21
.8	80		22		39	41	31	C		37	430		34				24	23
.9	90		23		44	45	32			38	480		37	10			26	25
1.0	100		25		50	50	34	D		40	530		41	12	10		27	27
1.2	120		30		62	58	41	E		43	580		49	14	11		31	31
1.4	140		32			66	45	F		46	690		58	16	13		34	34
1.6	160		37				50	G		48	790		66	18	14		38	38
1.8	180		41				54		000	50	900		74	20	16		40	43
2.0	200		45				58	H		52	1000		82	23	17	10	44	46
2.2	220						62	I		54	1100			25	18	11		51
2.4	240						65	J		56	1200			27	20	12		55
2.6	260						68			58	1280			30	21	13		58
2.8	280						70	K		59	1380			32	22	14		63
3.0	300						74	L		60	1475			34	24	15		68
3.2	320							M			1530			36	25	16		72
3.4	340							N			1630			39	26	17		76
3.6	360							O		62	1730			41	28	18		82
3.8	380										1850			43	29	19		86
4.0	400							P		64	1950			46	30	20		90
4.2	420										2050			48	32	21		95
4.4	440							Q			2160			50	33	22		100
4.6	460							R		66	2270			52	34	23		104
4.8	480								00	67	2380			54	36	24		109
5.0	500							S		68	2480			57	37	25		112
5.5	550							T		69	2660			63	40	27		124
6.0	600							U		71	2900			68	44	30		135
7.0	700									74	3375				51	35		160
8.0	800								0	77	3380				58	40		172
9.0	900							V		81	4300				64	45		195
10.0	1000							W		85	4600					49		218
11.0	1100									88	5200					55		
12.0	1200									92	5620					59		

<b>VISCOSITY CONVERSION CHART (Continued)</b>																		
Poise	Centipoise	DuPont Parlin 7	DuPont Parlin 10	Fisher 1	Fisher 2	Ford Cup 3	Ford Cup 4	Gardner - Holdt Bubble	Gardner - Lithographic	Krebs Unit KU	Saybolt Universal SSU	Zahn 1	Zahn 2	Zahn 3	Zahn 4	Zahn 5	Sears Craftsman Cup	Din Cup 4
13.0	1300							X		95	6100					64		
14.0	1400								1	96	6480							
15.0	1500									98	7000							
16.0	1600									100	7500							
17.0	1700									101	8000							
18.0	1800							Y			8500							
19.0	1900										9000							
20.0	2000									103	9400							
21.0	2100										9850							
22.0	2200										10300							
23.0	2300							Z	2	105	10750							
24.0	2400									109	11200							
25.0	2500							Z-1		114	11600							
30.0	3000									121	14500							
35.0	3500							Z-2	3	129	16500							
40.0	4000									133	18500							
45.0	4500							Z-3		136	21000							
50.0	5000										23500							
55.0	5500										26000							
60.0	6000							Z-4	4		2800							
65.0	6500										30000							
70.0	7000										32500							
75.0	7500										35000							
80.0	8000										37000							
85.0	8500										39500							
90.0	9000										41000							
95.0	9500										43000							
100.0	10000							Z-5	5		46500							
110.0	11000										51000							
120.0	12000										55005							
130.0	13000										60000							
140.0	14000										65000							
150.0	15000							Z-6			67500							
160.0	16000										74000							
170.0	17000										83500							
180.0	18000										83500							
190.0	19000										88000							
200.0	20000										93000							
300.0	30000										140000							

**Note:** All viscosity comparisons are as accurate as possible with existing information. Comparisons are made with a material having a specific gravity of 1.0.

<b>VOLUMETRIC CONTENT OF HOSE OR TUBE (English Units)</b>							
I.D. (inches)	cc/ft.	Cross Section (in. <sup>2</sup> )	Length				
			5ft. (60")	10ft. (120")	15ft. (180")	25ft. (300")	50ft. (600")
1/8	2.4	.012	.003 gal. .4 fl. oz.	.006 gal. .8 fl. oz.	.010 gal. 1.2 fl. oz.	.016 gal. 2.0 fl. oz.	.032 gal. 4.1 fl. oz.
3/16	5.4	.028	.007 gal. .9 fl. oz.	.014 gal. 1.8 fl. oz.	.022 gal. 2.8 fl. oz.	.036 gal. 4.6 fl. oz.	.072 gal. 9.2 fl. oz.
1/4	9.7	.049	.013 gal. 1.6 fl. oz.	.025 gal. 3.3 fl. oz.	.038 gal. 4.9 fl. oz.	.064 gal. 8.2 fl. oz.	.127 gal. 16.3 fl. oz.
5/16	15.1	.077	.020 gal. 2.5 fl. oz.	.040 gal. 5.1 fl. oz.	.060 gal. 7.6 fl. oz.	.100 gal. 12.7 fl. oz.	.199 gal. 25.5 fl. oz.
3/8	21.7	.110	.029 gal. 3.7 fl. oz.	.057 gal. 7.3 fl. oz.	.086 gal. 11.0 fl. oz.	.143 gal. 18.4 fl. oz.	.287 gal. 36.7 fl. oz.
1/2	38.6	.196	.051 gal. 6.5 fl. oz.	.102 gal. 13.1 fl. oz.	.153 gal. 19.6 fl. oz.	.255 gal. 32.6 fl. oz.	.510 gal. 65.3 fl. oz.

<b>VOLUMETRIC CONTENT OF HOSE OR TUBE (Metric Units)</b>							
I.D. (mm)	cc/m	Cross Section (mm <sup>2</sup> )	Length				
			1.5m	3.0m	4.5m	6.0m	7.5m
3.6	10.2	10.2	15.3 cc	30.5 cc	45.8 cc	61.1 cc	76.3 cc
5.6	24.6	24.6	36.9 cc	73.9 cc	110.8 cc	147.8 cc	184.7 cc
6.8	36.3	36.3	54.5 cc	109.0 cc	163.4 cc	217.9 cc	272.4 cc
8.8	60.8	60.8	91.2 cc	182.5 cc	273.7 cc	364.9 cc	456.2 cc

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# MANUAL CHANGE SUMMARY

This manual was published to replace Technical Manual IL-259-A, *Paint Related Information for REA and REM Guns*, to make the following changes:

1. Revised Figure 3 "High Voltage Supplies".
2. Revised "Paint and Solvent Specifications" chart in the "Appendix".

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