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ERDE TR 168-

DR43689

Producement Executive Ministry of Defence

Explosives Research and Development Establishment - Rocket Propulsion Establishment

Explosives Research

and Development

Establishment

Technical Report
No. 168

The Compatibility of 'Loctite' Sealants with Explosives

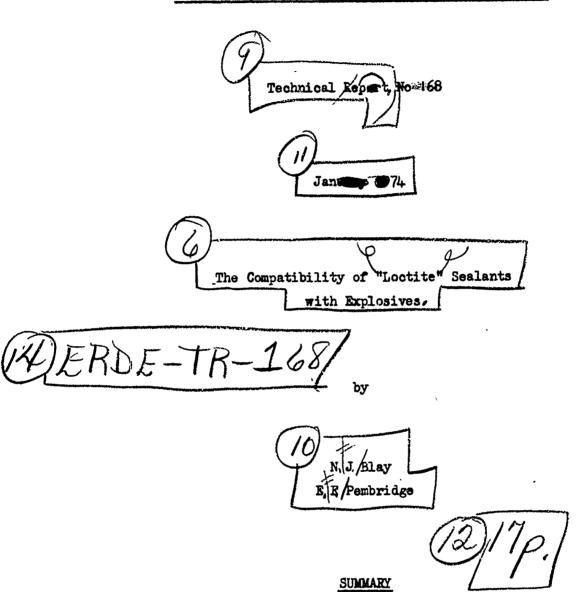
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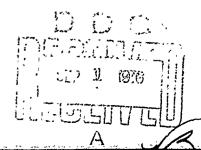
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EXPLOSIVES RESEARCH AND DEVELOPMENT ESTABLISHMENT



The explosives compatibility properties of a number of commercially obtainable sealants, marketed under the trade name "Loctite", are discussed and reported.

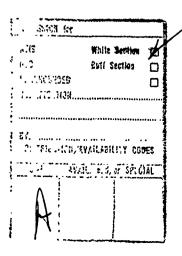


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CONTENTS

			Page No
1	INTRO	ODUCTION	5
2	MATE	RIALS TESTED	6
3	METHO	ODS OF COMPATIBILITY TESTING	6
	3.1	Preparation of Samples	6
	3.2	Methods of Testing	7
4	RESUI	LTS	7
	4.1	Compatibility with Double-Base Propellants	7
	4.2	Compatibility with High Explosives	7
	4.3	Plastic Propellants	8
	4.4	Pyrotechnics and Gunpowder	8
	4.5	Initiatory Explosives	8
5	CONCI	LUSIONS	8
6	REFE	RENCES	9
	Table	e 1	10 - 16



1 INTRODUCTION

"Loctite" sealants are anaerobic adhesives based upon acrylate acid diesters and having the general formula:

$$H_{2}C = C - C - O - (CH_{2})_{m} - C - O - C = CH_{2}$$

$$R' - C - C - C = CH_{2}$$

$$m = 1$$
 to 8, $n = 1$ to 20, $p = 0$ or 1

The adhesives are essentially monomeric, thin liquids, which with suitable catalysts, polymerise to form a tough plastic bond when confined between closely fitting metal parts in the absence of air. Their self hardening properties are based on two factors: (1) contact with air keeps the monomeric adhesive liquid and (2) metal surfaces accelerate the anaerobic polymerisation out of contact with air. A typical composition is tetraethylene glycol dimethacrylate monomer with catalysts such as cumene hydroperoxide (2%) and accelerators such as benzoic sulphimide (0.3%). To prevent premature gelling, benzoquinones may be added as stabilisers, and various other ingredients, such as silica to alter the viscosity and dyestuffs to aid identification, may also be included.

Polymerisation or curing of the acrylate acid diesters is essentially a free-radical type addition polymerisation, viz:

$$H_2C = C - C - 0$$

$$CH_2 - CH_2 - 0$$

$$CH_2 - CH_2 - 0$$

$$CH_3 - C - CH_3$$

$$CH_3 - CH$$

^{*&}quot;Loctite", Trademark, Loctite Corporation USA, marketed by Douglas Kane Group Ltd, Swallowfields, Welwyn Garden City, Herts.

The presence of tetra functionality in the monomer can lead, of course, to crosslinking and a thermoset structure.

During the past decade these sealants have found increasing use in various items of ammunition where there has been need for compatibility with explosives, and as a result a large number of "Loctites" have been tested. It was the purpose of this report to collect all the results obtained and to present this information together with the judgements relating to explosives compatibility.

2 MATERIALS TESTED

In all cases materials are identified by the manufacturer's code name. Further information is available from the firms' published data sheets. In general there are no Government specifications controlling the chemical composition of these materials, although some element of control can be exercised by MQAD through Approved Firms Schedules. This is always an important consideration for materials required to be compatible with explosives, since assurance is required that the formulation of the material tested will not be changed without notification to the Inspecting Authority.

Readers are therefore advised to confirm with MQAD and/or ERDE that materials chosen on the basis of this report are still of the same composition.

3 METHODS OF COMPATIBILITY TESTING

3.1 Preparation of Samples

The tests were carried out mainly with the materials in the liquid state as received, but in some cases further tests were performed using the polymerised (solid) sample. In order to obtain the cured sample, a special procedure was devised. The liquid sealant was poured into a dish, approx 2.5 cm diameter by 2.5 cm deep, made of aluminium foil. Having added a small amount of stainless steel filings, between 0.1 - 0.2 g, the dish was placed in a small glass desiccator, the lid of which was fitted with a cork carrying two

taps. With both taps open, one was connected to a supply of nitrogen and the desiccator purged for 15 minutes. This was repeated twice a day, and after three days the sealant had cured to a hard solid disc. The foil having been peeled away, the sample was rasped to a powder for the tests.

The state of the s

3.2 Methods of Testing

These have already been described in a previous report on the testing of epoxy resins for compatibility with explosives.²

Tests with initiators were carried out either (a) in contact, ie the sample mixed with the initiator, or (b) in the vapour phase, ie the sample in proximity to, but not in contact with, the initiator. In the table of results the tests used are identified by (C) A for contact tests and (C) B for vapour phase.

4 RESULTS

The results of tests on both liquid and polymerised sealants are given in Table 1.

4.1 Compatibility with Double-Base Propellants

only in isolated cases has incompatibility been detected by the normal methods with double-base propellants. However, as is shown by the low pH values recorded for many of these materials in Table 1, they are frequently quite strongly acidic. Because of this, approvals for their use have usually included stipulations that contact with propellants should be minimised and in some cases approval has been withheld. The materials extracted from the more acidic grades by water behave as strong acids when titrated and, because of the known catalytic action of strong acids on the decomposition reactions of nitrate esters, the compatibility of these "Loctites" must be regarded with some suspicion despite the satisfactory compatibility results which are usually obtained. Fortunately, the use of "Loctites" usually involves their application to a small component or area to be sealed and they are left enclosed between two surfaces with very little exposure where contact with propellants can occur.

Only in these circumstances, can approval for the use of many of the grades listed in Table 1 be given without question.

4.2 Compatibility with High Explosives

With the exception of amatol, high explosives usually appear satisfactorily compatible with "Loctites" although a degree of reactivity is often observed,

particularly with Torpex. However the same qualifications in regard to the high acidity and its effects on compatibility which are discussed in Section 4.1 apply equally to high explosives.

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4.3 Plastic Propellants

No instance of incompatibility with the sealants has been recorded with plastic propellants typified by RD2304 and containing ammonium picrate and perchlorate. The same reservations must be made however regarding the use of those "Loctites" which are excessively acidic.

4.4 Pyrotechnics and Gunpowder

No instances of chemical incompatibility which could lead to a hazard have been recorded between pyrotechnics and the sealants. Once again however note would have to be taken of any high residual acidity in the sealants. Gunpowder has also been tested with many sealants and found to be compatible.

4.5 Initiatory Explosives

Direct contact between the sealants and most of the common initiatory explosives does not appear to introduce any serious risk of chemical action leading to explosion.

Some adverse effects should however be mentioned. Absorption of an unpolymerised liquid sealant by an initiatory explosive would be expected to cause a great reduction in sensitiveness and this combination of materials is therefore not advisable. Regard should also be taken of the acidic nature of most of these sealants. Lead azide is especially susceptible to increase in decomposition under acid conditions. This is particularly undesirable since the evolution of hydrazoic acid vapour in such circumstances is a proven cause of hazard due to the formation of sensitive azide deposits on the metal of the weapon assembly.

5 CONCLUSIONS

As a rule, "Loctite" sealants can be expected to be compatible with high explosives (except amatols), and with single-, double- and triple-base propellants, plastic propellants, pyrotechnics, gunpowder and most initiatory compositions.

Some aspects of the composition of these materials are however obscure, and clearance for compatibility with explosives cannot be assumed without confirmation that the particular grade has been tested and that its composition is

adequately guaranteed to correspond to the approved sample. The considerable acidity of some grades of "Loctite" also casts doubts on their acceptability although this is not as a rule reflected in their behaviour in compatibility tests.

6 REFERENCES

1 Twiss S B Adhesives of the Future. Applied Polymer Symposium No 3.

Interscience Publishers, NY, 1966,

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2 Blay N J, Pembridge E F The Compatibility of Epoxy Resins with

Explosives.

ERDE TR 110. July 1972

NOTE

LOCTITE (UK) Limited expressed concern lest the references in this report to the acidity of some grades of LOCTITE could be misconstrued as indicating that these materials could be corrosive to metals. They wish to state that LOCTITE anaerobic adhesives are in no way corrosive.

					Tests of	TABLE 1 is of "Loctite" Sealants Compatibilities Compatible; I = Incompatible)	ants s compatible)		,		
lant	aurey Hr		High Ex	High Explosives (VS	(VS Results)	_		Colloidal	Colloidal Propellants	,	Clearance with Derotechnics
Code Number	(aqueous							St	Stabiliser Tests	12	Creatance with firstermine Initiators and Plastic Propellants
Description		ດກ 100°C	Amatol at 100°C	Torpex 4A at 120°C	RDX/TNT at 120°C	Others	SV Test at 80°C	Propellant and Stabiliser Content	Trial Conditions	Increase in Stabiliser Consumption	
liquid	5.5	(T# 8,°2)	I (> 10.4 ml)	(5.03 ml)		Pentolite (C) (3.38 ml)	(q 049)	SC 8.81 (Carbamite)	4 weeks, 80°C	(\$\hat{\varkappa}(z)	Gunpowder G20 (C)
								1.06 (DPA)	3 weeks, 80°C	ပ်(နိုင်	
polymerised	4°	(0.78 æ)	I (>12.9 ml)	C m)		Pentolite (G) (2.47 ml)	(1 092)	SC 8.81 (Carbamite)	4 Yeeks,	0 (101)	Gúnpoxder G2O (C)
			}		·			7NH 1.06 (DPA)	3 weeks, 80°C	ပ ဖွဲ့	
liquid	6.1	(1.79 al.)		(10.94 m)	(4,52 m)		(388 h)	N 7.21 (Carbamite)	4 Weeks. 80°C	I (55%)	Plastic Prop RD2304 (C) (O,32 ml) Lead Azide (C) A VH2 Composition (C) A 'A' Composition (C) A
polymerised	4.9			(4.00 ml)				=	z	c (25%)	,
Liquid	ት*2	(0.72 ml)	I (>14.1 ml)	C (5.06 ml)	C (4.61 ml)	Fontolite (C) (2.46 ml)	C (1468 h)	N 7.21 (Carbamito)	4 veeks, 80°C	I (55%)	Plastic Prop. RD2504 (C) (0.53 ml) Lead Azide (C) A VH2 Composition (C) A 'A' Composition (C) A
polymerised	3.1			رلھ (2.41)				=	=	c (28%)	
liquid	5.2	C (1.59 ml)	I (> 14.2 ml)	(1m 60°5)		Pentolite (C) (3.40 ml)	(q 999)	SC 8.81 (Carbamite)	4 weeks, 80°C	(3KE)	Plastic Prop RD2304 (C) (O.71 ml) Gunpowder G20 (C) Lead Azide (C) A.
								1.06 1.06 (PA)	3 weeks, 80 c	د (ک <u>ح</u> کا)	RD1305.Composition (C) A RD4651 Composition (C) A A *********************************

						9)	TABLE 1 (Contd) Compatibilities Compatible; I = Incompatible)	s compatible)				
"Loctite" Sealant		anten Rd		High E	Explosives (VS	Results)			Colloidel	Colloidal Propellants		Clearance with Pyrotechnics.
per		(aqueous extract)	{			(m)		 - - -	S	Stabiliser Tests	i s	Initiators and
Description			100°C	Amatol at 100°C	Torpex 44 at 120°C	at 120°C	Others	So the st	Propellant and Stabiliser Content	Trial Conditions	Increase in Stabiliser Consumption	001011011011
В розут	polymerised	5.7	C 1.04 (1.04	(LR 8.41.<)	(4.57 ml)		Pentolite (C) (3.68 ml)	CA 21.6)	SC 8.81 (Carbamite)	4 weeks, 80 c	c (52%)	Plastic Prop RD2304 (C) (0,48 ml) (umpowder G20 (C)
									1.06 1.06 (A90)	3 weeks, 80°C	0 (16 %)	Lend Azide (C) A RD1303 Composition (C) A RD1651 Composition (C) A 'A' Composition (C) A
CVV	liquid	2.4	C (0.81 ml)	(>14.1 al.)	(7.11 ml)	(4.86 m1)	Pentolite (C) (2.08 ml)	(928 h)	N 7.21 (Carbewite)	4 veeks, 80 c	I (\$0\$)	Plastic Prop BD2304 (C) (O,41 ml) Lend Azide (C). A VH2 Composition (C) A 'A' Composition (C) A
=Klod	polymerised	2.9		-25 table	(2.77 m)					z	c (23%)	
EV	liquid	3.5	(0.71 m)							***		
HVV Solya	liquid	2.4	(0.39 al)	(5.13.8 ml)	(5.03 al)	(4,37 ml)	Pentolite (C) (2.73 ml)	(1624 h)	.N. 7.21 (Carbamite)	* * * * * * * * * * * * * * * * * * *		Plastic Prop BD2304 (C) (0,35 kl) Lead Azide (C) A VH2 Composition (C) A 'A' Composition (G) A
					(2.62 m)				ľ		(26%)	
Screw Lock (Cat No 59)	liquid	**************************************	(1.20 al)	(>17.4 al.)	د (4.71 مل)	. (2.50 al)	Pentolite (C) (2.08 ml)	(9.72 h)	SC 8.81 (Carbamite) N 7.21 (Carbamite) FNH 1.06 (UFA) CDB	3 % % % % % % % % % % % % % % % % % % %	ပေတို့ ပေတို့ ပေတို့ ပ	Plastic Prop ED2304 (G) "(0.37 ml)

TABLE 1 (Contd)

THE REPORT OF THE PARTY OF THE

		Glearance with Pyrotechnics, Initiators and	ratio fropellants	Plastic Prop RD2304 (C) (0.25 ml)		Plastic Prop RD2304 (C) (0.31 ml)		Plastic Prop RD2304 (C) (0.59 ml)	
		ts.	Increase in Stabiliser Consumption	0 (M) 0 (M) 0 (M)	(§ v§	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	ა ^{(§} ნ	ر (کوم) د د رکول)	υ <mark>χ</mark> υ <u>ξ</u>
	Colloidal Propellants	Stabiliser Tests	Trial Conditions	t weeks, 4 weeks, 6 weeks, 80 cc. 3 weeks,	6 48 9 48 0 40	4 Weeks, 4 Weeks, 800CC	3 days, 80°c	4 weeks, 4 weeks, 80°C	3 Weeks, 80°C 3 days, 80°C
	Colloidal	S	Propellant and Stabiliser Gontent	SC 8.81 (Carbamite) 7.21 (Carbamite)	(2004) CDB T.70 (2-NDPA)	SC 8.21 (Carbamite) 7.21 (Carbamite) FNH (DPA)	CDB 1.70 (2-NDPA)	SC 8.81 (Garbamite) N 7.21 (Garbamite)	PNE 1.06 (DPA) CDB 1.70 (2-NDPA)
ilities I = Incompatible)			SV Test	о (1671 в.)		C (1551 h)		(4 66v)	
Compatible; I = Inc.	Results)		Others	Pentolite (C) (2.32 al)		Pentolite (C) (3.80 al)		Pentolite (G) (2.66 mL)	
dmo) =))			RDX/INT at 120°C	C (1.79 ml)		C (1,25 al)		(2.23 m)	
	High Explosives (VS Results)		Torpex 4A at 120°C	(3.71 al.)		C (2.97 ml.)		C (4.59 ml)	
,	High Ex		Amatol at 100°C	(>18.4 ml)		1 (> 14.2 al.)		I (*17.9 ml)	
		į	18 t 20 c	(0.82 m.)		(0.67 æ)		C (1.50 m)	 .,
	off Value	(aqueous extract)				5.5		٠ ٢	
	"Loctite" Sealant	Code Musber	no rock in part	Plastic Gasket (Cat No 66) liquid		Pipe Seal (Gat No 71) liquid		Nut Lock (Cat No 74) liquid	

TABLE 1 (Coatd)

	Learance With ryrotechnics, Initiators and	SAUSTISON VINETA	Flastic Prop ED2304 (C) (0.69 ml)	Pleatic Prop RD2304 (C) (0.76 ml) Composition SR548A (C)	Plastic Prop ED2304 (C) (O.44 ml)
	10	Increase in Stabiliser Consumption	689 689 689 689	. v 8 v 8 v 8 v 8	(\$6) (\$6) (\$6)
Propellants	tabiliser Test	Trial Conditions	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	7 4 80 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	1 weeks, 80 c 80 c 3 weeks, 3 weeks, 80 c 80 c
Calland 1	Š	Properlant and Stabiliser Content	S. S	SC 8.81 (Carbamite) 7.21 (Carbamite) FNH 1.06 (DPA) CDB 1.70 (C-NDB)	SC 8.81 (Carbamite) 7.21 (Carbamite) FNH 1.06 (DPA) CDB 1.70 .
		3V Yest	, 167 h.	C (1359 h)	(1359 h)
ne. 1ts)	•	str0	Pento_it (1 68 nl)	Pentolite (C) (2.07 ml) PEIN (C) (0.51 ml)	Rentolits (C) (3.32 ml)
		RDX/TNT at 120°C	C (°. 91 ml.)	(1.36 m)	(2.74 ml)
		Torpex 4A at 120°C	(E 70.5)	(4.22 ml)	C (5.05 ml)
High B		Amatol at 100°C	I (>18.4 ml)	I (>18.5 ml)	I (>16.9 ml)
,		05 100°C	C (1.21 ml)	(0.44 ml)	C (0.94 ml)
Suc on H	(aqueous	/10871Ya	o.",	4 50	.×.
"Loctate" Sealant	No Code Nurber	Description	Retaining Compound (Cat No 75) itquid	Instant Flastic Gasket liquid	Tube Weld liquid
_	High Explosives (VS Rev. 14s) (Collected Propellants	"Loctite" Sealant pH Value High Explosives (VS Rev.145) Code Nirber (aqueous and	"Loctite" Sealant pH Value (aqueous (aqueous extract) CE Amatol Torpex 4A RDX/TNT at at at at at an at at at an an and and concentrate (aqueous concentrate) CE (aqueous extract) CE (aqueous at an and and and and and and an at an at an and concentrate (concentrate)		Postitien Sealant Postitien Propertion Propertion

TABLE 1 (Contd)

Totalies Sealant 19 Value Eigh Daylosives (15 Regults) Cohere Stabiliser Tests Cohere Cohe							(C = Com	Compatibilities (C = Compatible; J = Inc	pilities I = Incompatible)				-
Code Number Pape state Pa	Loct	ite" Sealant			High E	mplosives (VS	Results)			Colloidal	Propellants		
Particle	Š	de Number	educous							St	abiliser Test	80 25	Learance with Frotechnics, Initiators and
Paris Seal 11quid 4.0 (1,41,11) (5/6.5 ml) (1,89 ml) (2.11 ml) (99.2 h)	<u></u>	scription	extract	ඩු <u>ද</u> ගි ධ	Amatol at 100°C	Torpex 4A	RDX/THT	Others	SV Test	Propellant and Stabiliser Content	Trial Conditions	Increase n Stabiliser Consumption	Liabtic fropeliants
Stud Lock (Cat No 41) liquid Stud Lock Stud Lock (Cat No 41) liquid Stud Lock Stud Lock (Cat No 41) liquid Stud Lock Stud Lock Stud Lock Stud Lo	15 Weld S		0.4	1 "	I (>16.3 ml)	(Lm 09.4)	° (1.89 ±1)	Pentolite (C) (2.11 ml)	c (942 h)	SC 8.81	4 weeks, 80°c	ပ <u>ိုင်</u> ပ	Plastic Prop RD2304 (C) (1.04 ml)
Stud Lock (Cate No 41) liquid 5.3 (0.85 ml) (-77.7 ml) (4.65 ml) (1.29 ml) (1757 ml) (177.5 ml) (1										7.21	4 weeks, 80°C	c (#9)	••
Stud Lock (Cat Mo 41) liquid 3.3 (0.65 ml) (.77.1 ml) (4.60 ml) (1.29 ml) (1.55 ml) (1										PNH FNH 1.06	3 weeks, 80°c	ა <mark>წ</mark>	
Stud Lock (Cat No 41) liquid 3.3 (0.83 ml) (>77.1 ml) (4.60 ml) (1.29 ml) (1.55 ml) (1353 h) (Carbanite) (Carbanit				## ##	_					CDB 1.70 (2-NDPA)	3 deys. 80°C	υ (36) υ (36)	
Companies Comp	16 Stud L		3.3	1	I (>17.1 ml)	C (4.60 ml)	C (1.29 ml)	Pentolite (C) (1.55 ml)	C (1383 h)	28.8 89.	4 weeks, 80 C	ပ ်	Plantic Prop ED7,304 (C) (0,43 ml)
Total Superation Total Superation										(Carbentte) N 7.21	4 weeks. 80°C	ە (غۇد)	Med Agide (C) B Silver Agide (?) B
Loctite 270										TNH 1.06	3 weeks, 80°c	ა (3 6)	
liquid 2.4 C I C C C C S ml) (>17.6 ml) (1.88 ml) (1.208 ml) (1272 h) 8.81 80°C (15%) BDC (C) C Carbamite) (0.91 ml) (2.08 ml) (1272 h) 8.81 80°C (11%) C C C C C C C C C C C C C C C C C C C	· · · · · · · · · · · · · · · · · · ·									CDB 1.70 (2-NUPA)	3 days. 80°c.	ა (ჭნ ა ()	
(Garbamite) 7.21 80°C (Garbamite) FNH FNH 7.06 (DPA) CDB 7.07 80°C (TPA) (TPA) (TPA) (TPA)	 	1	4.5	, c (0.68 m)	I (>17.6 ml)	C (4.62 ml)	C 1.88 m)	Pentolite (C) (2.08 ml)	C (1272 h)	ာ 8 8.8	4 weeks,	C (3821.)	Plastic Prop RD2304 (C) (0.82 ml)
3 weeks, 80°C 3 days, 80°C								(0.91 ml)		(Carbamite) N 7.21	4 weeks, 80°C	C (11%)	
3 days.										1.06	3 weeks, 80°C	(%) 0	
(V.)#(u=7)	m-+ # waterman		v =100 this process	•						CDB 1.70 (2-NDPA)	3 days.	ပ ်	

TABLE 1 (Contd)

		Initiators and	riabile riopersants	Plastic Prop RD2304 (C)			Plastic Prop RD2304 (C) (0.45 ml) Composition SR548A (C) Lead Azide (C) B Silver Azide (C) B
		ts.	Increase in Stabiliser Consumption	0 (455) (458) (458) (458)			(45%) (45%) (45%) (45%) (45%)
	Colloidal Propellants	Stabiliser Tests	Trial Conditions	4 weeks, 4 weeks, 8000 3 weeks, 8000 3 days, 8000			# weeks, 80°C # weeks, 80°C 3 weeks, 80°C 3 days,
	Colloidal	S	Propellant and Stabiliser Content	SC 8.8- (Carbamite) N 7.21 (Carbamite) FWH 1.06 (DPA) CDB	(Z-717-Z)		SC 8.81 (Carbamite) N 7.21 (Carbamite) FNH 1.06 (LPA) CDB 1.70
ilities I = Incompatible)		_	SV Test	C (1743 h)			(435 h)
1 🖴			Others	Pentolite (C) (2.63 ml)			Pentolite (C) (2.49 ml) PENN (C) (0.44 ml)
Compat: (C = Compatible;	Results)		RDX/INT at 120°C	C (1.67 m2)	C (2.72 ml)	C (3.08 m)	C (2.40 ml)
	High Explosives (VS Results)		Torpex 4A at 120°C	C (4,61 ml)			(1,86 ml)
	High E		Amatol et 100°C	I (>11.6 ml)			(6.75 ml)
			100 00	C (0.68 ml)	CO.81 ml)	C (1.21 ml)	C (0.73 ml)
	:	equeous	extrect	4.4	2.7		۶. ۲.
	"Toctite" Sealant	Code Number	Description	Refrigerant Sealant liquid	Loctite 308 Impact Resistant Adhesive liquid	Loctite 312 (Adhesive/Accelerator) cured 24 h at RT	Locquic Primer T Locquic Primer T
		ş	•	द्य	\$	8	₽.

TABLE 1 (Contd)

					âmo⊃ = ⊃)	Compatibilities (C = Compatible; I = Incompatible)	s compatible)				
Moetstell Seal ant	:		High I	High Explosives (VS Pesults)	Results)		a	Collordel	Colloidel Propellants		Carrence with Derotechnics
Code Number	aqueous)							1S	Stabiliser Tests	83	Initiators and
Description	extract)	CE TOO'C	Amatol at 100°C	Torpex 4A at 120°C	RDX/TWT at 120°C	Others	SV Test at 80°C	Propellant and Stabiliser Content	Trial Conditions	Increase in Stabiliser Consumption	Lastic eropetration
Locquic Activator Batch E198 liquid (activator diluted 1 part in 20 with TOE)	6.3	0.86 EL)		(2.97 ml)	encontratament au employ, chamical balancia a est			SC 8.81 (Carbanite) N 7.21 (Carbanite) FNH	4 80 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	υ <mark>ξ</mark> ξ υ <mark>ξ</mark> ξ υξξ	Fiastic Prop RD2304 (C) (0.27 al.)
Sealant AVX liquid , , , , , , , , , , , , , , , , , , ,	0 4 6 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0							(DPA)			Lead Azide (G) A Lead Azide (C) A

DOCUMENT CONTROL SHEET

(Notes on completion overleaf)

1. PRIC Reference (if known)	2 Originator's Pofo	ronco 3 Aganay Pafarana	4. Report Securi
1. 1 (16 Neterence (II Known)	ERDE TR 168	J. Agency Reference	Classificatio UNLIMITED
5. Originator's Code (if known) 445050			
5a.Sponsoring Agency's Code (if known)	6a.Sponsoring Agency	(Contract Authority) Name	and Location
76. Title COMPATIBILITY	OF "LOCTITE" SEAT	LANTS WITH EXPLOSIVES	· /
7a.Title in Foreign La .axe	(in the case of trans	lations)	
7b.Presented at (for conferen	ce papers).Title, pla	ce and date of conference	
8. Author 1. Surname, initials	9a Author 2	9b Authors 3, 4	10. Date pp re
Blay N J	Pembridge E F		1.1974 12 2
ll. Contract Number	12. Period	13. Project	14. Other References
l5. Distribution statement			
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