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PARLIN LABORATORY REPORT

SUBJECT: KN NEOPRENE PAINTS - CONDITION OF TEST PANELS AFTER SIX MONTHS IMMERSION IN AVIATION GASOLINE, SOUR CRUDE OIL, A SOUR NAPHTHA DISTILLATE, AND SEA WATER.

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SUBJECT: KN NEOPRENE PAINTS - CONDITION OF TEST PANELS AFTER SIX MONTHS' IMMERSION IN AVIATION GASOLINE, SOUR CRUDE OIL, A SOUR NAPHTHA DISTILLATE, AND SEA WATER.

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## I - INTRODUCTION

Several years ago, the Rubber Chemicals Division developed a paint product and a putty based on a new type of neoprene known as KN neoprene. These products were brought to the attention of the F & F Department, and it was decided to evaluate them as corrosion-resistant coatings particularly for use on the interior of petroleum storage tanks. Accordingly, a testing program comprising immersion tests in gasoline, sour crude oil, a sour naphtha fraction and sea water, was carried out on a large number of panels coated with the Rubber Chemicals Division #55 KN Neoprene Paint and various modifications of this formula. The neoprene coated panels were prepared according to a scheme whereby such factors as surface preparation of the metal, priming and coating thickness of the neoprene top coats were systematically varied. This report covers the results of this work after six months' immersion in the four test liquids.

## II-RESULTS AND CONCLUSIONS

The test data on the individual panels are tabulated at the end of this report. A study of these data leads to the following chief conclusions.

1. None of the KN neoprene coatings was entirely satisfactory against all four test liquids. The sour naphtha fraction had the severest action and caused failure of one kind or another on almost all the panels. The sour crude oil had a similar action to the sour naphtha fraction, but was much less severe and a number of the KN neoprene coatings were satisfactory against this liquid after six months' immersion. The aviation gasoline had no deleterious effect on the neoprene coatings and practically all of them were satisfactory after six months in this liquid. The sea water caused failure by blistering on a fairly large proportion of the panels.

2. Several modifications of the #55 formula were definitely superior to this product in all-around performance. Those which stood out as best were formulas P-11, P-17, P-7, P-10 and P-6. The composition of these products as compared to the #55 formula is given under Experimental.

3. While the results are rather discouraging in that they indicate none of the individual neoprene compositions to be entirely satisfactory, they do suggest that possibly a satisfactory composition could be developed by combining the good features of the better compositions given above. Thus, the results indicate that a combination of P-11 and P-17, or P-7, P-11, and P-17 might give better performance than any one of these formulas individually.

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4. Other corrosion-resistant paints included in our tests for comparative purposes were not as good in general performance as the better KN neoprene compositions at a comparable coating thickness. The other paints that were tested included 353-45003 Bakelite Red over 373-759 Submarine Primer, 353-803 Chlorinated Rubber Paint, and Minnesota Mining Company's Thiokol Cement EC-498.

5. The results indicate that in general the protection afforded by the neoprene coatings increases with the coating thickness. It was also noticed that less coating thickness was needed for the same protection when the paint was applied by spray rather than by brush.

6. The results definitely established that both sand-blasting and priming of the metal are essential for the development of satisfactory adhesion of these KN neoprene coatings. The primer used in our work was developed by the Rubber Chemicals Division and is based upon chlorinated rubber and type E neoprene in a 5/1 ratio. The formula of this primer known as C-101 Neoprene Priming Cement is given under Experimental.

## III-EXPERIMENTAL

### Previous Work and Scope of Present Work

KN neoprene is a new type of neoprene which is chemically similar to the other types, and like them has good resistance to oils and gasolines in the vulcanized state. The KN type, however, is better adapted to paint formulation than the older types of neoprene for the following reasons:

(1) It gives lower solution viscosities, permitting higher solids at brushing and spraying viscosities.

(2) By use of suitable accelerators it can be vulcanized faster than the other types, at lower temperatures, and without applied pressure.

Using KN neoprene, the Rubber Chemicals Division has formulated two standard paint products. These are: (1) a brushing cement or paint, known as #55 Neoprene Brushing Cement, and (2) a troweling compound or putty, known as #85 Neoprene Troweling Compound. The #55 Brushing Cement has a total solids of 55% and has the consistency of a paint; the #85 Troweling Compound has a total solids of 85% and has the consistency of a putty. The formulas of these products are given under Experimental, but in a general way, the solids composition in both cases comprises about equal parts of KN neoprene and carbon black by weight, together with minor amounts of chemical plasticizer, antioxidant and softener. The solvent is a mixture of aromatic and high solvency petroleum naphthas.

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Just before using, a vulcanization accelerator must be added to these compositions; this limits the stability to several hours, after which excessive thickening or gelling occurs. The paint can be applied by brushing, or, as we have demonstrated, by spray application also, if properly thinned. The troweling compound is applied like a putty with a putty knife or with a spreading tool of convenient shape and size. The paint or putty film sets initially to a soft, slightly tacky state by solvent evaporation alone, and in this stage it lacks any resilience or snap back. After the solvents are completely eliminated, which requires 12 to 48 hours' air drying depending on the film thickness, the coating is then cured or vulcanized by a heat treatment of 24-48 hours at about 150°F. This eliminates the tack, toughens and hardens the coating, and increases its resistance to swelling in hydrocarbon solvents. However, the vulcanized film is still rather soft, and is tough, rubbery, flexible, and elastic; that is, it snaps back. Vulcanization or curing will also occur at ordinary temperatures, but is much slower, requiring about three weeks.

These neoprene coating materials were tested in a preliminary way by the Rubber Laboratory as corrosion-resistant coatings against a variety of corrosive liquids. These tests returned promising results and these were brought to the attention of the F & F Department. As a result, it was decided that F & F would assume the responsibility for carrying through any evaluation program on KN neoprene paints, particularly with reference to their use as corrosion-resisting coatings on the interiors of tanks and drums used to store and transport petroleum products.

This report covers the results of the evaluation work done at Perlin up to the present time. This work comprised the preparation of some 200 KN neoprene coated test panels and subjecting these coated panels to conditions simulating those met on the interior surfaces of petroleum storage tanks. This was done by immersing the coated test panels in sea water, aviation gasoline, a sour crude oil and a sour naphtha distillate. The test panels consisted of 5"x12" pieces of 1/8" gauge boiler plate steel, coated on both sides with KN neoprene paints, and sealed along the edges with the #85 KN Neoprene Troweling Compound. Most of the panels were coated with the #55 KN Neoprene Paint, and with this paint the following factors were systematically varied and investigated:

(1) Metal: new plate and old corroded plate.

(2) Surface preparation: wire brushing and sand-blasting.

(3) Priming: none; C-101 Primer; C-101 Primer plus C-84 Tie Cement.

(4) Application: Brush and spray.

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(5) Coating Thickness: varied from 2 to 25 mils; some panels prepared at even higher coating thicknesses of 1/16" and 3/16".

(6) Vulcanization: 24-48 hours in air at 150°F.; 48 hours in water at 150°F.; 5 months at room temperature.

In addition, quite a number of modifications of the #55 formula were prepared and tested under a single set of coating conditions. These modifications of the #55 paint represent formulas in which (1) the pigment to neoprene ratio was varied, (2) formulas in which corrosion-inhibiting pigments were substituted for the carbon black, (3) formulas in which zinc oxide, magnesia, and litharge were used as vulcanizing ingredients, and (4) formulas in which compatible resins were added to the neoprene composition. In addition to the neoprene coated panels, several other types of corrosion-resistant paints were also included in the immersion tests for comparative purposes.

## IV-DETAILED RESULTS AND CONCLUSIONS

The test data are tabulated at the end of this report. In these tables, the panels are listed according to number and the various columns show for each panel the type metal that was used; the surface preparation; the priming material; the top coat material; the coating thickness; and the vulcanization conditions. The other columns indicate the condition of each panel after six months' immersion in the three tanks which contained: (1) sea water and aviation gasoline, (2) sea water and a sour naphtha distillate, (3) sea water and a sour crude oil. The sea water was the bottom layer in each case and covered the lower four inches of each test panel; the sour oils or gasoline layer covered the next four inches, and the remainder of the panel was in the vapor phase. Data are given on the condition of the panels in all three phases; that is, the water, the liquid oil or gasoline, and the vapor phase above the sour oils or gasoline. Since the test tanks were tightly covered, high vapor concentrations developed in the upper part of the tanks.

A careful study of these data obtained after six months' immersion has led to the following conclusions:

1. None of the KN neoprene coatings was entirely satisfactory against all four test liquids.

None of the neoprene coatings was satisfactory against both the sour naphtha distillate and sea water.

Several of the neoprene coatings were satisfactory against both the sour crude oil and sea water.

A fair proportion of the neoprene coatings was satisfactory against both aviation gasoline and sea water.

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None of the other corrosion-resistant coating materials used for comparative purposes were entirely satisfactory either and in general were not as good as the better KN neoprene compositions.

2. The sour naphtha distillate had the most severe action on all the neoprene coatings. In all but two cases a definite tackiness or "gumminess" of the neoprene developed in this liquid. The two exceptions were formulas P-8 and P-17. These did not develop the characteristic tackiness but had other shortcomings.

The sour crude oil had a similar action to the sour naphtha but was much less severe, and several of the KN neoprene coatings were satisfactory against this liquid after six months' immersion.

The aviation gasoline had no deleterious effect on the neoprene coatings and practically all of them were satisfactory after six months in this liquid.

The sea water caused failure by blistering on a fairly large proportion of the panels. Most of these were coated with the #55 formula, and other modifications of this formula were much superior in water-resistance, being entirely free of blistering after six months' immersion in sea water. At high coating thicknesses, and also when C-84 Neoprene Tie Cement was used as an undercoat, the #55 formula also satisfactorily withstood six months' immersion in sea water without blistering.

3. Several of the modifications of the #55 formula were definitely superior to #55 in all-around performance. Those which stood out as best were:

P-11: This is a modification of the #55 formula in which small amounts of zinc oxide and magnesia were used as vulcanising ingredients. These materials definitely improved the water-resistance and also overcame the tackiness of the #55 formula in the sour crude oil but not in the sour naphtha.

P-17: This is a modification of the #55 formula in which a compatible indene-coumarone resin, Nevindene R-1, was used in a 1:1 ratio with the KN neoprene. This improved resistance to sea water and overcame the tackiness of the #55 formula in both the sour naphtha and sour crude.

P-7: This is a modification of the #55 formula in which red lead was used as the pigment in place of carbon black. This improved the sea water-resistance and overcame the tackiness of the #55 formula in the sour crude oil but not in the sour naphtha distillate.

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P-10: This is a modification of the #55 formula in which zinc oxide was used as a pigment in place of the carbon black. This improved the resistance to sea water and overcame the tackiness in the sour crude oil but not in the sour naphtha distillate.

P-6: This is a modification of the #55 formula in which a much higher ratio of carbon black to neoprene was used. This slightly improved the resistance to sea water and overcame the tackiness in the sour crude oil but not in the sour naphtha distillate. The higher carbon black content also hardened and toughened the coating and overcame the tackiness of the #55 formula prior to vulcanization. These are all advantages, since the #55 coating is definitely on the soft side even after vulcanization.

In addition to the above formulas, all of which showed improved water-resistance to the #55 formula, the use of C-84 Neoprene Tie Cement as an undercoat together with the C-101 Neoprene Primer definitely improved the sea water resistance of the #55 top coat. This is shown by panels 14B and 15B. The C-84 Neoprene Tie Cement contains zinc oxide and magnesia, and perhaps it is the presence of these ingredients which is responsible for the improved water-resistance, as in formula P-11 where these same ingredients improved the water-resistance of the top coat.

Formulas P-12 and P-13 also showed better sea water resistance than the #55 formula but these formulas which contained litharge as a vulcanization ingredient do not have satisfactory stability against gellation and are not practical for this reason.

Formula P-8 which contained zinc yellow, a basic zinc chromate, in place of the carbon black in the #55 formula is interesting because it did not develop tack in the sour naphtha distillate. Only one other formula, P-17, showed similar absence of tackiness after six months' immersion in the sour naphtha. Formula P-17 also has good water-resistance, but formula P-8 is poor in this respect, being inferior to #55.

Detailed composition information on these various neoprene coatings will be found under Experimental.

4. While the results are rather discouraging in that they indicate no neoprene coating to be entirely satisfactory, they do suggest that possibly a satisfactory formula could be developed by combining the good features of the better compositions.

Thus P-11 is satisfactory in all respects except for the development of tackiness in the sour naphtha distillate. On the other hand, P-17 is free of tackiness but shows slight blistering in the presence of the sour naphtha and sea water. Combining the Nevidene R-1 resin in P-17 with the zinc oxide and magnesia in P-11, and possibly also increasing the carbon black content, might produce an entirely satisfactory composition.

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Or the use of the C-84 Neoprene Tie Cement as an undercoat to reduce blistering might make the P-17 formula entirely satisfactory.

Another possibility is a combination of the P-7 and P-17 formulas, or possibly even better the P-11, P-7 and P-17 formulas might all be combined.

Possibly also the use of a small amount of zinc yellow in the P-11 formula would eliminate the tack in the sour naphtha distillate without impairing the water-resistance. Zinc yellow used alone, as in the P-8 formula, gave no tackiness but had poor water-resistance.

These suggested formulas should be tried in any further work that is done on this problem.

5. For use in sour crude oil, aviation gasoline, and sea water, formulas P-11, P-17, P-7, P-10 and P-6 are all satisfactory as they stand after six months' immersion. Sour naphtha distillates are known to be very severely corrosive and perhaps we should not be discouraged too much by the results in this liquid. On the other hand, it is possible that the sour naphtha distillate gives an accelerated test, and that the results obtained with it are an early indication of what may occur later in the sour crude oil. In this case, the formulas suggested in paragraph 4 for obtaining better performance mainly in the sour naphtha distillate should also be better in sour crude oil.

When conditions permit, the next step in this work should be to get field tests made on the better neoprene compositions revealed in this study. We would select the following formulas for this purpose: #55, P-11, P-17, P-7 and the combinations of P-11, P-17, and P-7 suggested in paragraph 4.

6. As has been stated above, the failures in the sour naphtha distillate, and to a lesser degree in the sour crude also, were characterized by a softening or "gumming" of the neoprene composition so that the coating had become definitely tacky. This of itself might not be considered a failure of the coating, although it certainly would be objectionable in most applications. However, in many cases the tackiness was accompanied by loss of adhesion, and in some cases by complete detachment of the coating. It is noteworthy that, in the case of the sour naphtha, the most marked development of tack occurred in that part of the coating exposed to the vapor phase, rather than in the coating immersed in the sour naphtha liquid, although this had also become slightly tacky. With the sour crude oil, tack developed to about the same degree in those parts of the coating in the liquid and vapor phases. In this latter case, blistering also

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occurred on many panels, and was usually worst at the boundary of the vapor and liquid phases. The softening of KN neoprene in sour crude oil was noticed in some preliminary tests made at the Rubber Laboratory on the #55 formula, and our results confirm these previous findings.

7. Failure in sea water when it occurred was by blistering in the gasoline-sea water tank, and by blistering, loss of adhesion, and complete detachment of the coating in the sour naphtha-sea water tank. The sour naphtha quite evidently aggravated the action of the sea water. Blistering was usually worst at the boundary of oil and water phases. In the sour crude oil-sea water tank, some intermixture or emulsification of the two liquids occurred, and this reduced the severity of the sea water in this series of tests. Our statements on the effect of sea water are, therefore, based almost entirely on the results obtained in the other two tanks.

Blistering in sea water decreased with increasing coating thickness. Thus, with the #55 coating, which we tested at 2, 5 and 10 brush coats, there was usually considerable blistering at 2 coats, a slight amount of 5 coats, and none at 10 coats. A brush coat corresponds to a coating thickness of about 2 mils, so that when the #55 formula was brushed on a coating of about 20 mils thickness was required to eliminate completely the blistering in sea water. When applied by spray, however, a 10 mil coating thickness of the #55 formula, or 12 spray coats, was sufficient to prevent blistering in sea water. The reason for this is not clear, but possibly it may be because the coating applied by spray is smoother, denser, and less porous than that applied by brush.

All of the above statements apply to coatings on sand-blasted steel, primed with two coats of C-101 Neoprene Priming Cement. If either the sand-blasting or priming is omitted, the adhesion is greatly impaired and the blistering is usually worse.

By use of two coats of #84 Neoprene Tie Cement over two coats of C-101 Neoprene Priming Cement on sand-blasted steel, blistering of the #55 formula was eliminated at 5 brush coats. The use of the additional undercoat of the #84 Tie Cement was thus definitely beneficial in reducing blistering of the #55 formula in sea water. Refer to panels 14B and 15B in the tables.

With the preferred modifications of the #55 formula given in paragraph 3 (formulas P-11, P-17, P-7, P-10 and P-6) no blistering in sea water occurred at 5 brush coats over two brush coats of C-101 Primer on sand-blasted steel. Thus, these formulas are definitely superior to #55 which required 10 brush coats under these same conditions to eliminate blistering.

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8. Aviation gasoline of itself has no deleterious effect on the neoprene coatings and all the coatings on sand-blasted, primed steel were in good condition after six months' immersion. However, poor adhesion and blistering were encountered in gasoline on panels in which either or both the sand-blasting and priming were omitted. On properly sand-blasted and primed panels, two brush coats or as little as 3 mils of coating gave satisfactory protection against gasoline. When applied by spray, 3 spray coats or as little as 2 mils of coating gave satisfactory protection against gasoline and possibly even less than this could be used. These results are interesting, because there has been a demand for an interior coating for aviation gasoline drums and at these coating thicknesses a neoprene coating may be economically sound.

9. In general, the results show that the protection afforded by the neoprene coatings increases with the coating thickness. In practically all cases where blistering occurred, this decreased as the coating thickness was increased. It was noteworthy, however, that with extremely heavy coatings such as on panels 9A, 9B, 9C, 10A, 10B, 10C where coating thicknesses of 3/32" to 3/16" were used, there was a greater tendency for the coating to loosen and become more or less completely detached from the panel. These panels were prepared by using the #85 Troweling Compound to build up the coating thickness, and the results indicate that with this very heavy bodied material satisfactory adhesion is more difficult to obtain. Sand-blasting and priming are even more essential with the neoprene troweling compound than with the paints, although they are very important to success with the paints also.

It has already been pointed out that spray application enables the same protection to be obtained at lower coating thicknesses. Thus, with the #55 formula, 12 spray coats or 10 mils of coating, give equivalent protection against blistering in sea water to 10 brush coats or about 20 mils of coating. We do not know the reason for this, but these results indicate that important economies may be possible by spray application. Aside from reducing material costs, labor costs should be reduced also, for 12 spray coats can be applied much faster than 10 brush coats.

10. The importance of both sand-blasting and priming for satisfactory adhesion of these neoprene paints to steel has already been emphasized. This was stressed by the Rubber Laboratory also, and our results confirm these previous findings. Both sand-blasting and priming of the metal are important, but the omission of sand-blasting causes greater loss of adhesion than the omission of priming. Neither one can be omitted in practice, however, if satisfactory performance is to be obtained. Even formula P-17, that contains as much resin as neoprene and, therefore, might be expected to show improved adhesion, had poor adhesion direct to smooth steel.

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11. There was very little difference in the performance of the #55 paint over new steel, slightly rusted new steel, and badly corroded and pitted plate taken from an old oil storage tank. If anything, with the same surface preparation, somewhat better adhesion was noticed on slightly rusted metal and on the old corroded plate than on rust-free new steel.

12. Panels prepared with the #55 formula by vulcanization in air for 24 and 48 hours at 65°C., and for five months at room temperature without any heat treatment, did not show any noticeable difference in performance. Panels 5A, 5B, and 5C, which were vulcanized under water at 70°C. for 48 hours, showed a somewhat greater blistering in sea water and noticeably less development of tackiness in sour crude oil.

13. The other corrosion-resistant paints that were included in our tests for comparative purposes were 353-45003 Bakelite Red over 373-759 Submarine Primer, 353-803 Chlorinated Rubber paint without primer, and Minnesota Mining Company's Thiokol Cement EC-498 without any primer. These were tested at 5 brush coats over smooth and sand-blasted steel.

As we have already stated, these three paints were not as satisfactory as 5 brush coats of the better neoprene compositions. It should be stated, however, that with the chlorinated rubber and Thiokol paints, 5 brush coats gave only about half the coating thickness of 5 coats of the neoprene or of 353-45003 Bakelite paint.

353-45003 Bakelite Red over 373-759 Submarine Primer blistered in sea water, gasoline, sour naphtha and sour crude. It was also softened by the sour naphtha vapor. However, the adhesion was good to both smooth and sand-blasted steel, and despite the blistering the coating was intact and still providing good protection. This system had the best resistance to sea water of the three paints used for comparative purposes.

353-803 Chlorinated Rubber paint gave bad blistering in sea water and showed some blistering, peeling and embrittlement in gasoline. However, it was O.K. in the sour naphtha and sour crude, and had good adhesion to both smooth and sand-blasted steel. The chief defect of this finish is its poor resistance to sea water.

The 3M Thiokol Cement EC-498 blistered in sea water and gasoline. It also showed slight softening in the sour naphtha and some blistering in this liquid over smooth metal. It was O.K. in sour crude, and showed good adhesion to both smooth and sand-blasted metal. The chief defect of this coating is also its poor resistance to sea water.

14. In a separate phase of the work, the compatibility of KN neoprene and various resins at a 1:1 ratio was determined. The most compatible resins were found to be ester gum, Nevidene R-1,

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Arochlor 5460 and Beckacite 1118. The Bakelite XR-5180 used in formula P-16 was not as compatible as the resins just named, but it was selected for test in the P-16 formula because it was the least soluble in gasoline of the resins showing some degree of compatibility.

The compatible resins in general improve the adhesion of the neoprene coating, but they decrease the elasticity and resilience of the film. However, up to a ratio of 1:1 the toughness and flexibility of neoprene-resin films is still very good.

## V-EXPERIMENTAL DETAILS

These KN neoprene paints are prepared by milling the pigments and other ingredients into the KN neoprene to produce what is called a base compound which becomes the solids composition of the finished paint. This milling or grinding is done between steel rolls or it can be done on a heavy duty W-P type mixer. The base compound is then dissolved in a mixture of aromatic and high solvency naphthas to produce the finished paint, which at this point has good can stability if properly compounded. Just before using, however, a vulcanization accelerator must be added, and after this, a gradual thickening occurs which results in gelation after several hours. This gelation can be retarded by the addition of thinner, but in general it is necessary to prepare only as much of the accelerated paint mixture as will be used up in two or three hours.

We will now tabulate the formulas of the various neoprene paints covered by this report.

#55 Neoprene Brushing Cement

| | Parts by wt. | |
|---|---|---|
| Neoprene Type KN | 100 | ) |
| *Latac | 1 | ) Base compound |
| Neozone D (antioxidant) | 2 | ) mixed together |
| Soft Carbon Black | 100 | ) on rubber mill |
| Light Process Oil | 10 | ) |
| Base Compound | 213 | ) Dissolved in |
| Mixed Solvents (75% Solvesso #1) | 174 | ) mixer |
| (25% Xylene) | | ) |
| | 387 | |

*Latac = hexamethylene ammonium hexamethylene-dithiocarbamate. This is a chemical plasticizer for the neoprene. It increases the plasticity of the base compound and reduces the solution viscosity.

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#85 Neoprene Troweling Compound

| | Parts by wt. | |
|---|---|---|
| Neoprene Type KN | 100 | Base Compound mixed together on rubber mill |
| *D.O.T.G. | 4 | |
| Neozone D | 2 | |
| Semi-Reinforcing carbon black | 75 | |
| Light process oil | 10 | |
| Base Compound | 191 | Mix in heavy duty mixer |
| Xylene | 40 | |
| | 231 | |

*D.O.T.G. = Diortho tolyl guanidine. This is another chemical plasticizer for neoprene which is similar in its action to Latac.

#C-101 Neoprene Priming Cement

| | Parts by wt. | |
|---|---|---|
| Neoprene Type E | 100 | Base Compound mixed on rubber mill |
| Extra Light Calcined Magnesia | 10 | |
| F.F. Wood Rosin | 5 | |
| Neozone D | 2 | |
| Sulfur | 1 | |
| Semi-Reinforcing carbon black | 50 | |
| Cottonseed oil | 5 | |
| Zinc oxide | 10 | |
| Base Compound | 183 | Dissolved in mixer |
| Tornesit 20 cps. (chlorinated rubber) | 915 | |
| Toluene | 4400 | |
| | 5498 | |

#C-84 Neoprene Tie Cement

| | |
|---|---|
| Same Neoprene Type E Base Compound as above | 20% |
| Toluene | 80 |
| | 100% |

#100 E Brushing Cement Accelerator

| | Parts by wt. |
|---|---|
| Litharge | 100 |
| *Accelerator 833 | 25 |
| Xylene | 110 |
| | 235 |

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#100 C Troweling Compound Accelerator

| | Parts by wt. |
|---|---|
| Litharge | 100 |
| *Accelerator 833 | 25 |
| | 125 |

*Accelerator 833 composition not given.

It might be well to note here that the solvent mixture used in the #55 formula is not well adapted for brush application. The substitution of a higher boiling naphtha such as Solvesso #2 or Union Oil #30 for the Solvesso #1 improves the brushing properties. The viscosity of the #55 formula is also somewhat high for best brushing. In our work we found that the addition of 15% Union Oil #30 (H-202) definitely improved the brushing properties. This 15% addition of thinner reduces the viscosity from 136" to 48" in the 10 cup and decreases the total solids from 55 to 47.8%. For spray application, best results were obtained when the #55 formula was thinned 75% with H-202.

We give below the modifications of the #55 formula that are discussed in this report.

Formulas P-1 to P-6 (Similar to #55 except for a changed carbon black to neoprene ratio)

| Formula No. | P-1 | P-2 | *P-3 | P-4 | P-5 | P-6 |
|---|---|---|---|---|---|---|
| Neoprene Type KN | 100 | 100 | 100 | 100 | 100 | 100 |
| Latac | 1 | 1 | 1 | 1 | 1 | 1 |
| Neozone D | 2 | 2 | 2 | 2 | 2 | 2 |
| Soft carbon black | - | 50 | 100 | 150 | 150 | 250 |
| Light process oil | 10 | 10 | 10 | 10 | 10 | 10 |
| | 113 | 163 | 213 | 263 | 313 | 363 |

*P-3 is the same as #55; included for comparative purposes.

| | P-1 | P-2 | P-4 | P-5 | P-6 |
|---|---|---|---|---|---|
| Base Compound | 113 | 163 | 263 | 313 | 363 |
| Mixed Solvent (Xylene 75% (Union Oil 25% ( #30 | 138 | 133 | 215 | 209 | 242 |
| 100% | 251 | 296 | 478 | 522 | 605 |

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Formulas P-7 to P-10 (Similar to #55 but containing rust-inhibiting pigments in place of the carbon black)

| Formula No. | P-7 | P-8 | P-9 | P-10 |
|---|---|---|---|---|
| Neoprene Type KN | 100 | 100 | 100 | 100 |
| Latac | 1 | 1 | 1 | 1 |
| Neozone D | 2 | 2 | 2 | 2 |
| Light process oil | 10 | 10 | 10 | 10 |
| Red lead | 300 | - | - | - |
| Zinc yellow (A basic zinc (chromate ) | - | 150 | - | - |
| Calcium chromate | - | - | 100 | - |
| Zinc oxide | - | - | - | 200 |
| | 413 | 263 | 213 | 313 |
| Base Compound | 413 | 263 | 213 | 313 |
| Mixed Solvent (Xylene 75% (Union Oil #30 25% 100% | 222 | 215 | 174 | 208 |
| | 635 | 478 | 387 | 521 |

Formula P-11 (Similar to #55 but containing magnesia and zinc oxide for their acid accepting properties and their generally beneficial effect on the physical properties of neoprene vulcanizates)

| Formula No. | P-11 |
|---|---|
| Neoprene Type KN | 100 |
| Latac | 1 |
| Neozone D | 2 |
| Extra Light Calcined Magnesia | 4 |
| Zinc oxide | 1 |
| Light process oil | 10 |
| Soft carbon black | 100 |
| | 218 |
| Base Compound | 218 |
| Mixed Solvent (Xylene 75% (Union Oil #30 25% 100% | 178 |
| | 396 |

DUP030000935

Formulas P-12 and P-13 (Similar to #55 but containing litharge for the improved water-resistance it imparts to neoprene compounds)

| Formula No. | P-12 | P-13 |
|---|---|---|
| Neoprene Type KN | 100 | 100 |
| Latac | 1 | 1 |
| Neozone D | 2 | 2 |
| Light process oil | 10 | 10 |
| Zinc oxide | 10 | - |
| Litharge | 20 | 15 |
| Soft carbon black | 100 | 100 |
| | 243 | 228 |
| Base Compound | 243 | 228 |
| Mixed Solvent | | |
| (Xylene 75% | | |
| (Union Oil #30 25% | 199 | 187 |
| 100% | 442 | 415 |

Formulas P-16 and P-17 (These formulas contained Bakelite XR-5180 and Nevidene R-1 resins respectively at a 1:1 ratio to the KN neoprene)

| Formula No. | P-16 | P-17 |
|---|---|---|
| Neoprene Paint P-5 given above | 700 | - |
| Neoprene Paint P-6 given above | - | 700 |
| Bakelite XR-5180 solution (50% in xylene) | 268 | - |
| Nevidene R-1 solution (50% in xylene) | - | 232 |
| | 968 | 932 |

We give below the viscosities of the above formulas as made up and the thinning required for satisfactory brush application. The total solids and viscosities of the products as brushed are also given.

| Formula | Viscosity before thinning | %Thinning required for brushing | Viscosity after thinning | Total solids after thinning |
|---|---|---|---|---|
| #55 | 136" 10 cup | 15% | 48" 10 cup | 48% |
| P-1 | 105" 10 cup | 12.5% | 52" 10 cup | 40% |
| P-2 | 385" 10 cup | 30% | 59" 10 cup | 42.4% |
| P-4 | 171" 10 cup | 10% | 55" 10 cup | 50% |
| P-5 | 200" 10 cup | 10% | 61" 10 cup | 54.5% |

DUP030000936

| Formula | Viscosity after thinning | *Thinning required for brushing | Viscosity after thinning | Total solids after thinning |
|---|---|---|---|---|
| P-6 | 95" 10 cup | 5% | 55" 10 cup | 57.2% |
| P-7 | 194" 10 cup | 12.5% | 64" 10 cup | 57.8% |
| P-8 | 161" 10 cup | 11.5% | 64" 10 cup | 47.8% |
| P-10 | 140" 10 cup | 10% | 61" 10 cup | 54.5% |
| P-11 | 120" 10 cup | 10% | 58" 10 cup | 50.0% |
| P-12 | 209" 20 cup | 45% | 71" 10 cup | 38% |
| P-13 | 335" 20 cup | 55% | 85" 10 cup | 55.5% |

*Thinner composition E-15 50%, E-202 25%, E-504 25%.

The abnormally high viscosities of formulas P-12 and P-13 are due to the presence of litharge which causes gelation to occur. These formulas are not stable on aging and are not practical for this reason.

The other viscosities are within a normal range and what variation exists is due to a varying pigment content that causes a change in the neoprene concentration at any given total solids. Thus, in going from formulas P-1 to P-6, the increasing carbon black content increases the total solids at brushing consistency from 40 to 57.2%.

Viscosity data were not obtained on formulas P-15 and P-17 but these formulas brushed satisfactorily without further thinning or at a total solids of 57.4%.

For spray application, much more thinning is required in all cases. The amount of thinning for good spray application was determined only in the case of the #55 formula. In this case, 75% reduction with E-202 gave good spraying properties.

Resin compatibility tests were made with KN neoprene at a neoprene to resin ratio of 1:1. The results of these tests are given below.

| Good Compatibility | Fair Compatibility | Incompatible |
|---|---|---|
| Ester gum | 500 Kopol | Vinsol |
| Nevindene R-1 | Bakelite XR-3180 | Amberol K-12-A |
| Arochlor 5460 | Damar | Amberol 890-D |
| Beckacite 1118 | Butyl methacrylate polymer | Gilsonite |
| | Butyl isobutyl methacrylate polymer | Damar resene |
| | | Chlorinated rubber |
| | | Pliolite |
| | | RL-13011 |

DUP030000937

Incompatible
RC-212
RL-263
Amberol HH-1
Methyl Methacrylate
Polystyrene

The compatible resins in general improve the adhesion, and the hard brittle types of resin are more effective in this respect than the compatible methacrylates. Resins reduce the elasticity and resilience of the neoprene film, but up to a 1:1 ratio the toughness and flexibility are still very good.

The sour crude oil used in the immersion tests came from a Texas field and was supplied by the Humboldt Oil Company. The sour naphtha distillate that we used came from the Linden refinery of the Standard Oil Company of N.J.

DUP030000938

Appendix 1

We give below a copy of the instruction sheet which gives in detail the method used for preparing the test panels covered by this report.

1. File edges of panel to remove burrs and to smooth up sharp edges.

2. Wipe panel free of any grease with H-28 and then wipe dry. Use clean cloths for this. This step may not be necessary on sand-blasted panels.

3. Wire brush panel to remove any rust or loose scale. This applies to both smooth and sand-blasted metal.

4. Label one end of panel by inking the number over a white "Duco" followed by a top coat of clear lacquer, and then mask two inches of this end with two inch wide masking tape.

5. Set panel in vertical position in clamp on ring stand and apply one full brush coat of C-101 priming cement to both sides and over edges. Use two inch brush.

6. Remove panel from clamp, place in drying rack in vertical position with uncoated end in slot. Air dry 30 minutes.

7. Place panel back in clamp for painting and apply second full brush coat of C-101 priming cement to both sides and over edges. Again air dry 30 minutes in drying rack.

8. Add accelerator 100-C to troweling compound and apply the troweling compound to edges of the panel to seal them. Apply the troweling compound with a small spatula and put on layer about 1/16 to 1/8 inch thick around the edges. To smooth this coating, without its sticking to the spatula, try dipping the spatula in H-1, or use your fingers dipped in H-1 to smooth and press the troweling compound in place.

   Add the 100-C accelerator to the #85 troweling compound thinned with 10% H-202 just before using, and work in thoroughly with a spatula on a porcelain, glass or metal plate. Mix just enough accelerated compound for about two hours' use. One part by weight of 100-C accelerator to 16 parts by weight of the troweling compound should be used.

9. Add accelerator 100-E to #55 brushing cement thinned 15% with H-202 and brush on the first coat. Use a two inch brush and coat both sides and edges over the troweling compound. Keep brush well filled with the cement and apply rapidly. Strive for uniform application and smoothness, and practice this step until satisfactory skill has been obtained. After coating, place in drying rack and air dry one hour.

DUP030000939

Add the 100-E accelerator to the #55 brushing cement just before using. Shake the 100-E well and thoroughly stir into the cement. Mix just enough for one to two hours' use. One part by weight of 100-E accelerator to 16 parts by weight of the brushing cement should be used.

10. Apply succeeding coats of the brushing cement in the same manner as the first coat, allowing one hour air drying between coats.

11. After the last coat of brushing cement has been applied leave the entire coating system air dry for 48 hours.

12. Vulcanize 48 hours in a 70°C. oven or under other conditions as may be specifically designated.

DUP030000940

Appendix 2

We give below the instruction sheet prepared by the Rubber Chemicals Division covering the use of KN neoprene surfacing materials.

Neoprene Surfacing Materials:

1. Neoprene Brushing Cement #55
   (a) Cement Accelerator #100-E.

2. Neoprene Troweling Compound #85
   (a) Troweling Compound Accelerator #100-C.

3. Neoprene Priming Cement #C-101.

4. Neoprene Tie Cement #C-84.

Neoprene Surfacing Materials are unvulcanized compositions of neoprene dissolved in suitable solvents. Films deposited from these mixtures, when properly vulcanized, display the unique properties that are obtained from thousands of products made of neoprene. They are formulated to furnish protection for steel, wood and concrete surfaces from the action of corrosive liquids, vapors and abrasive wear.

## Preparation of Surfaces

1. Steel

When lining chemical process or storage tanks or covering other equipment exposed to severe dynamic service, such as agitator blades, chute linings, etc., the only recommended method is that of sand or grit blasting. For exterior surfaces where only vapors are encountered, scraping and wire brushing may be employed.

2. Concrete

New concrete surfaces usually require no special preparation. Old, contaminated surfaces should be cleaned by scraping, chipping, wire brushing or sand-blasting, depending upon the degree of contamination and the difficulty encountered in the removal of the contaminating substances.

3. Wood

New wood surfaces usually require no preparation. Old, contaminated surfaces should be cleaned down to fresh wood by scraping, sanding or wire brushing.

DUP030000941

## Surface Priming

Neoprene Priming Cement #C-101 is recommended as a primer coat, but other adhesives on the market may be substituted. We have found the following adhesives satisfactory and there are probably others available which we have not tested:

Cement M-162 - B.B.Chemical Company,Cambridge,Mass.

Ty Ply S - R.T.Vanderbilt Company,New York,N.Y.

Priming should be done as soon as possible after cleaning to prevent rusting or contamination.

When using Brushing Cement #55 for the lining of tanks or coating of equipment to be exposed to severe dynamic service, we recommend three brush coats of Cement No. C-101, allowing approximately one hour's drying time between coats, provided air is circulated over the surface.

To adhere cement coatings exposed to less severe service, one coat of C-101 is usually sufficient.

Since the troweling compound is normally used in applications where excellent adhesion is required, we recommend the use of the three-coat priming system for surfaces to which Trowelling Compound #85 is to be applied.

## Tie Cement

When surfaces are to be prepared for the application of Troweling Compound #85, the use of two coats of Tie Cement C-84 is recommended in addition to the primer coats. B.B.Chemical Cement M-117 has also proven satisfactory for this purpose and other neoprene cements may prove equally suitable. The last primer coat should be allowed to dry about one hour before application of the first coat of the cement, and approximately one hour drying time allowed between succeeding coats. The last coat of the cement applied should be dried at least one hour before application of the troweling compound, but we do not recommend drying longer than six hours.

## Preparing the Accelerated Mixes

Dried films deposited from Neoprene Surfacing Materials as received are not vulcanizable, and will not respond properly to heat treatment.

To convert them into vulcanizable compositions, it is necessary to add accelerators as described below:

DUP030000942

1. Neoprene Brushing Cement #55

Just prior to use we recommend the addition of Accelerator 100-E in the ratio of 1/2 pint to one gallon of the cement. The accelerator should be agitated vigorously before measuring and thoroughly stirred into the cement.

While the unaccelerated cement is stable for six months or longer if stored in a cool place, the mixture will pre-vulcanize to such an extent as to be unbrushable within approximately one-and-a half hours after addition of the accelerator.

2. Troweling Compound #85

Just prior to use, Accelerator 100-C should be mixed thoroughly with the compound. We recommend a ratio of one ounce (by weight) of 100-C to one pound of the troweling compound. Mixing may be done by hand on a mortar board of metal or wood with a putty knife or other convenient mixing tool. If large amounts are involved, an internal mixer may prove more satisfactory.

Like the brushing cement, troweling compounds are rendered unstable by the addition of the accelerator and must be applied within the same period of time.

Technique of Application

1. Cement No. 55

Application may be made by brushing. It should be flowed on from a full brush and "brushed out" only enough to prevent excessive "curtaining". Sufficient cement should be kept on the brush at all times to prevent "dragging". This is especially important after the first coat, as "dragging" may damage an underlying layer.

The cement may be applied by spraying, although brushing is the preferred method. Satisfactory spraying results have been obtained by the use of a Spraco Model 678 (Latex Gun) and an NC-3 nozzle with 30 lbs. of air pressure. Both gun and nozzle are manufactured by the Spray Engineering Company, Somerville, Mass.

2. Troweling Compound No.85

This compound may be applied with a spreading tool of any convenient shape and size. Thick coats should be built up in two or three successive plies with as much spreading pressure as possible to work out air pockets which are formed when the compound is first applied. This method of application has been found to give better results than that of immediately spreading on the compound to the desired thickness and leveling out.

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A short time after the compound has been applied, the surface may be smoothed by a trowel or by rolling lightly with a steel roller. To prevent sticking to the tool during this operation, the surface must be kept wet with alcohol or a soap solution.

If the smoothing operation is followed by further application of troweling compound or brushing cements, alcohol should be used since the dried soap solution will prevent the proper adhesion between layers.

## Drying of Completed Systems

The drying time recommended for each coat of primer, tie or brushing cement is only sufficient to permit the application of succeeding coats without wiping off the under coatings. The drying of the completed covering system is a much more important operation and if blistering or porosity is to be avoided evaporation of solvent must be complete before vulcanization is attempted. Furthermore, a temperature not exceeding 95°F. should be used for drying. For coatings 1/16" or thicker, 48 hours is required to dry thoroughly at this temperature and an adequate air circulation should be maintained during this time. For thinner films a shorter drying period will suffice.

## Vulcanization

After thorough drying, vulcanization is accomplished by the addition of more heat. The temperature during vulcanization can be raised to 158°F. (70°C.), but unless a definite pressure can be maintained on all surfaces, it is not advisable to vulcanize at temperatures in excess of this figure. Hot air or hot water may be used as the heat transfer medium. Depending on the film thickness and the medium used, vulcanization is accomplished in 24 to 48 hours at 158°F. Lower curing temperatures can be used with correspondingly longer time of exposure; for example, a good degree of vulcanization can be obtained in approximately three weeks at room temperature (75°F.).

In some cases it may be found advisable to reduce the amount of added accelerator below that recommended above, in order to obtain a longer stability time for application. In this case, a correspondingly longer cure time will be required.

## Film Coverages

### 1. Cement No. 55

One gallon will cover approximately 21 square feet with a dried film 1/32" thick.

### 2. Troweling Compound No. 85

One pound will cover approximately one square foot with a dried film 1/8" thick.

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## Film Thicknesses

The number of coats of Cement No. 55 to be applied to any particular surface will depend upon the severity of service. For purposes such as tank lining it is not possible to recommend a certain number of coats due to the different variables involved. The thickness of dried film per coat will depend upon the individual technique used in the application and the age of the cement when applied. (The cement gradually thickens after the accelerator is added.) The average thickness of coat is probably about 0.006". Heavy coatings may be applied by allowing the cement to thicken somewhat before applying. A more accurate method for obtaining a definite film thickness is to apply a definite volume of cement to a definite area of surface without reference to the number of coats required.

In general, it is more economical to use the troweling compound for thicknesses of 1/8" and greater. More uniform film gauges can be obtained by the use of brushing cements. Where abrasion is a factor in the service life of the lining, the troweling compound is preferred.

If it is desired to line a product having discontinuous surfaces (such as rectangular tanks, etc.) with applications of Brushing Cement No. 55, it is advisable to fillet the corners with Troweling Compound No. 85 before brushing on the first coat of brushing cement. Sharp edges which are difficult to cover with brushing cement should be treated by applying Troweling Compound No. 85 to them.

## Fire and Health Precautions

Since Neoprene Surfacing Materials contain inflammable coal tar solvents (toluene, a toluene substitute for petroleum origin, xylene, etc.) they should not be used near open flames or electrical equipment from which sparks may be emitted.

The vapors from Neoprene Surfacing Materials will form explosive mixtures with air. Adequate circulation should be provided to prevent concentration of fumes.

Prolonged breathing of the vapors or constant bodily contact should be avoided. In applications on partially enclosed surfaces, as in tanks, air masks should be worn.

The recommendations for the use of Neoprene Surfacing Materials are based upon tests believed to be reliable. However, we do not guarantee the results obtained.

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## Neoprene Surfacing Materials

| Neoprene Surfacing Materials | Price | Std. Cont. | Std. Sample |
|---|---|---|---|
| *Brushing Cement No. 55 | $6.00 gal. | 5 gal. | 1 qt. |
| *Trowelling Compound No. 85 | 1.25 lb. | 20 lb. | 2 lb. (1 qt.) |
| **Neoprene B. C. Accelerator 100-E | 1.75 qt. | 1 qt. | 2 oz. |
| **Neoprene T. C. Accelerator 100-C | .75 pt. | 2 lb. gal. | 2 oz. |
| ***Neoprene Priming Cement C-101 | $1.00 | $1.50 $5.00 | 1/2 pt. |
| ***Neoprene Tie Cement C-84 | 1.00 | 1.50 5.00 | 1/2 pt. |

* Orders for quantities in excess of 10 gallons of Cement No. 55 and 20 pounds of Troweling Compound No. 85 should be referred to Wilmington for approval, giving details of proposed installation.

** Recommended quantities shown below furnished free of charge with all orders for surfacing materials:

| Surfacing Material Ordered | Accelerator Furnished |
|---|---|
| per gal. Brushing Cement No. 55 | 8 oz. (1/2 pt.) B.C. Acc. 100-E |
| per lb. Troweling Compound No. 85 | 1 oz. T.C. Accelerator 100-C |

Additional quantities will be billed at the listed prices.

*** When Neoprene Surfacing Materials are applied in the conventional manner to metal, concrete, or wood, it is necessary to use a bonding agent to secure adequate adhesion. All orders for Neoprene Surfacing Materials should be carefully checked to make sure that one or both of these adhesives are included.

Application of protective coating systems with Neoprene Surfacing Materials is described in mimeographed form "Directions for the Application of Neoprene Surfacing Materials."

JPS:RMW

DUP030000946

| DESCRIPTION OF PANELS | | | | | | | | CONDITION AFTER 6 MONTHS IMMERSION | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | TANK NO. 1 | | | TANK NO. 2 | | | TANK NO. 3 | | |
| PANEL NO. | METAL | SURFACE PREPARATION | PRIMING MATERIAL | TOP COAT MATERIAL | NUMBER OF COATS | COATING THICKNESS (IN MILS) | VULCANIZATION CONDITIONS | GASOLINE VAPOR | GASOLINE LIQUID | SEA WATER LIQUID | SOUR NAPHTHA VAPOR | SOUR NAPHTHA LIQUID | SEA WATER LIQUID | SOUR CRUDE VAPOR | SOUR CRUDE LIQUID | SEA WATER LIQUID |
| 1A | New 1/8" Gauge Boiler Plate Steel | Sand Blasted | 2 Coats G-101 Neoprene Priming Cement | #55 Neoprene Brushing Cement | 2 Brush Coats | 3.4 | 48 hours in air at 65°C. | OK | OK | Blistering and rusting thru | OK Tacky | OK Slightly tacky | Blistered and rusted | Slight blistering at liquid vapor boundary | Slight blistering at liquid vapor boundary | OK |
| 1B | Same as 1A | Same as 1A | Same as 1A | Same as 1A | 5 Brush Coats | 9.5 | Same as 1A | OK | OK | Slight blistering at wat r gasoline boundary | OK Tacky | OK Slightly tacky | Slight blistering and slight rusting | Slight tack; sl. blistering at liquid vapor boundary | Slight blistering at liquid vapor boundary | OK |
| 1C | Same as 1A | Same as 1A | Same as 1A | Same as 1A | 10 Brush Coats | 19.6 | Same as 1A | OK | OK | (Slight (blistering (ing at (water (gasoline (boundary (Best 1A, (1B, 1C | Tacky and detsched in spots | OK slightly tacky | OK | OK tacky | OK Sl.tack | OK |
| 1'A | Same as 1A | Sand blasted but sl. rusted when coated | Same as 1A | Same as 1A | 2 Brush Coats | 3.1 | Same as 1A | OK | OK | Bad blistering Some rusting thru | OK tacky | OK Slight tack | Blistered and rusted | Tacky slight blistering at liquid vapor boundary | Sl. tack slight blistering at liquid vapor boundary | OK |
| 1'B | Same as 1A | Same as 1'A | Same as 1A | Same as 1A | 5 Brush Coats | 8.1 | Same as 1A | OK | OK | Some blistering particularly at water gasoline boundary | OK tacky | OK Slight tack | Blistered and slight rusting | Tacky slight blistering at liquid vapor boundary | Sl.tack sl.blistering at liquid vapor boundary | OK |
| 1'C | Same as 1A | Same as 1'A | Same as 1A | Same as 1A | 10 Brush Coats | 16.8 | Same as 1A | OK | OK | Slight. blistering Best of 1'A, 1'b, 1'c | Tacky loss of adhesion | OK Slight tack | Slight blistering | OK tacky | OK slight tack | OK |
| 2A | Same as 1A | Same as 1A | Same as 1A | Same as 1A | 2 Brush Coats | 3.3 | 24 hrs. in air at 65°C. | OK | OK | Some blistering slight rusting thru | Slight blistering and tacky | OK slight tack | Blistered and rusted | Tacky slight blister at liquid vapor boundary | Slight tack Slight blistering at liquid boundary | OK |
| 2B | Same as 1A | Same as 1A | Same as 1A | Same as 1A | 5 Brush Coats | 11.0 | Same as 2A | OK | OK | Sl. blistering particularly at water gasoline boundary | OK tacky | OK slight tack | Slight blistering | Tacky slight blister at liquid vapor boundary | Slight tack slight blister at liquid vapor boundary | OK |
| 2C | Same as 1A | Same as 1A | Same as 1A | Same as 1A | 10 Brush Coats | 23.6 | Same as 2A | OK | OK | OK | Tacky loss of adhesion | OK Slight tack | OK | OK tacky | OK Sl.tack | OK |
| 3A | Same as 1A | Same as 1A | Same as 1A | Same as 1A | 2 Brush Coats | 4.1 | No heat treatment 5 mos. at room temperature | OK | OK | Blistering and rusting | Tacky loss of adhesion | OK Slight tack | Blistered and rusted | Tacky slight blistering at liquid vapor boundary | Slight tack; slight blistering at liquid vapor boundary | OK |
| 3B | Same as 1A | Same as 1A | Same as 1A | Same as 1A | 5 Brush Coats | 12.5 | Same as 3A | OK | OK | Slight blistering | Tacky loss of adhesion | Slight tack and blistered | Slight blistered | Tacky slight blistered at liquid vapor boundary | Slight tack slight blistering at liquid vapor boundary | OK |

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| DESCRIPTION OF PANELS | | | | | | | | CONDITION AFTER 6 MONTHS' IMMERSION | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | TANK NO. 1 | | | TANK NO. 2 | | | TANK NO. 3 | | |
| PANEL NO. | METAL | SURFACE PREPARATION | PRIMING MATERIAL | TOP COAT MATERIAL | NUMBER OF COATS | COATING THICKNESS (IN MILS) | VULCANIZATION CONDITIONS | GASOLINE VAPOR | GASOLINE LIQUID | SEA WATER LIQUID | SOUR NAPHTHA VAPOR | SOUR NAPHTHA LIQUID | SEA WATER LIQUID | SOUR CRUDE VAPOR | SOUR CRUDE LIQUID | SEA WATER LIQUID |
| 3C | Same as 1A | Same as 1A | Same as 1A | Same as 1A | 10 Brush Coats | 24.0 | Same as 3A | O.K. | O.K. | O.K. | Tacky, loss of adhesion | Slight tack & blistered | O.K. | O.K. tacky | O.K. slight tack | O.K. |
| 5A | Same as 1A | Same as 1A | Same as 1A | Same as 1A | 2 Brush Coats | 3.9 | 48 hrs. in water at 70°C. | O.K. | O.K. | Blistering and rusting | O.K., slight tack | O.K., very slight tack | Slight Blistering & rusting | Slight blistering, no tack | Slight blistering, no tack | Slight blistering, no tack |
| 5B | Same as 1A | Same as 1A | Same as 1A | Same as 1A | 5 Brush Coats | 12.5 | Same as 5A | O.K. | O.K. | Blistering and rusting | O.K., slight tack | O.K., very slight tack | Blistered | Very slight blistering, no tack | Very slight blistering, no tack | O.K., no tack |
| 5C | Same as 1A | Same as 1A | Same as 1A | Same as 1A | 10 Brush Coats | 24.0 | Same as 5A | OK | O.K. | O.K. | O.K. slight tack | O.K. very slight tack | Blistered | Very slight blister no tack | Very slight blister no tack | O.K. no tack |
| 6A | Same as 1A | Same as 1A | None | Same as 1A | 2 Brush Coats | 4.0 | Same as 1A | O.K. | Slight blistering | Bad blistering & rusting | O.K., tacky | O.K., slight tack | Blistered and rusted | Tacky, slight blistering at liquid vapor boundary | Slight tack, slight blistering at liquid vapor boundary | O.K. |
| 6B | Same as 1A | Same as 1A | None | Same as 1A | 5 Brush Coats | 11.0 | Same as 1A | O.K. | O.K. | Slight blistering, particularly at water gasoline boundary | Tacky, loss of adhesion | O.K., slight tack | Blistered | O.K., tacky | O.K., slight tack | O.K. |
| 6C | Same as 1A | Same as 1A | None | Same as 1A | 10 Brush Coats | 22.0 | Same as 1A | O.K. | Slight blistering | Slight blistering | O.K., tacky | O.K., slight tack | O.K. | O.K., slight tack | O.K., very slight tack | O.K. |
| 6'A | Same as 1A | Sand-blasted but slightly rusted when coated | None | Same as 1A | 2 Brush Coats | 2.7 | Same as 1A | O.K. | O.K. | Blistering & slight rusting | O.K., tacky | O.K., slight tack | Blistered | Slight tack, slight blistering, at liquid vapor boundary | Slight tack, slight blistering, at liquid vapor boundary | O.K. |
| 6'B | Same as 1A | Same as 6'A | None | Same as 1A | 5 Brush Coats | 8.2 | Same as 1A | O.K. | O.K. | Blistering particularly at water gasoline boundary | O.K., tacky | O.K., slight tack | Blistered | O.K., slight tack | O.K., slight tack | O.K. |
| 6'C | Same as 1A | Same as 6'A | None | Same as 1A | 10 Brush Coats | 19.3 | Same as 1A | O.K. | Slight blistering | O.K. | O.K., tacky | O.K., slight tack | Very slight blistering | O.K., slight tack | O.K., slight tack | O.K. |
| 7A | New 1/8" Gauge Boiler Plate Steel | Wire Brushed | Same as 1A | #55 Neoprene Brushing Cement | 2 Brush Coats | 5.0 | Same as 1A | O.K. but adhesion poor | Blistered & loosened | Blistered & loosened particularly at water gasoline boundary | O.K., tacky, poor adhesion | Slight tack & blistered | Coating detached | O.K., slight tack | Slight tack, slight blistering | O.K. |
| 7B | Same as 7A | Wire Brushed | Same as 1A | Same as 7A | 5 Brush Coats | 12.5 | Same as 1A | O.K., but adhesion poor | Slight blistering | Blistered & loosened particularly at water-gasoline boundary | O.K., tacky, poor adhesion | O.K., slight tack | Coating detached | O.K., slight tack | O.K., slight tack | O.K. |
| 7C | Same as 7A | Wire Brushed | Same as 1A | Same as 7A | 10 Brush Coats | 25.0 | Same as 1A | O.K., but adhesion poor | O.K. | O.K. | Tacky, loss of adhesion | O.K., slight tack | Coating detached | O.K., slight tack | O.K., Slight tack | O.K. (best of 3) |

DUP03000948

| DESCRIPTION OF PANELS | | | | | | | | CONDITION AFTER 6 MONTHS IMMERSION | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | TANK NO. 1 | | | TANK NO. 2 | | | TANK NO. 3 | | |
| PANEL NO. | METAL | SURFACE PREPARATION | PRIMING MATERIAL | TOP COAT MATERIAL | NUMBER OF COATS | COATING THICKNESS (IN MILS) | VULCANIZATION CONDITIONS | GASOLINE VAPOR | GASOLINE LIQUID | SEA WATER LIQUID | SOUR NAPHTHA VAPOR | SOUR NAPHTHA LIQUID | SEA WATER LIQUID | SOUR CRUDE VAPOR | SOUR CRUDE LIQUID | SEA WATER LIQUID |
| 7'A | Rusted weathered 1/8"Gauge Boiler Plate Steel | Wire Brushed | Same as 1A | #55 Neoprene Brushing Cement | 2 Brush Coats | 4.0 | Same as 1A | O.K. Fair Adhesion | Some blistering | Bad Blistering | OK Tacky | Slight blistered slight tack | Coating Detached | OK slight tack | Slight tack slight blister | O.K. |
| 7'B | Same as 7'A | Wire Brushed | Same as 1A | #55 Neoprene Brushing Cement | 5 Brush Coats | 10.4 | Same as 1A | O.K. Fair Adhesion | O.K. | Blistered particularly at water-gasoline boundary | OK tacky fair adhesion | OK Slight Tack | Coating detached | OK Slight Tack | Slight tack slight blister | O.K. |
| 7'C | Same as 7'A | Wire Brushed | Same as 1A | #55 Neoprene Brushing Cement | 10 Brush Coats | 22.0 | Same as 1A | O.K. Fair Adhesion | O.K. | Blistered and loosened | Coating detached | OK Slight tack | Coating detached | OK slight tack | OK slight tack | O.K. |
| 8A | Same as 1A | Wire Brushed | None | #55 Neoprene Brushing Cement | 2 Brush Coats | 4.7 | Same as 1A | O.K. Fair Adhesion | Slight blistering | Slight blistering | Tacky loss of adhesion | OK Slight Tack | Coating detached | O.K. Slight tack | O.K. Slight tack | O.K. |
| 8B | Same as 1A | Wire Brushed | None | #55 Neoprene Brushing Cement | 5 Brush Coats | 11.0 | Same as 1A | O.K. poor Adhesion | Blistered | Slight blistering at water gasoline boundary | Tacky, coating detached | O.K. slight tack | Coating detached | O.K. slight tack | Slight tack slight blister | O.K. |
| 8C | Same as 1A | Wire Brushed | None | #55 Neoprene Brushing Cement | 10 Brush Coats | 22.0 | Same as 1A | O.K. poor adhesion | Blistered | Loosened from panel | Tacky coating detached | O.K. slight tack | Coating detached | O.K. slight tack | Slight tack | O.K. |
| 8'A | Rusted weathered 1/8" Gauge Boiler Plate Steel | Wire Brushed | None | #55 Neoprene Brushing Cement | 2 Brush Coats | 3.4 | Same as 1A | O.K. poor adhesion | Blistered | Bad blistering and loosening | O.K. Tacky | Slight tack slight blistering | Coating detached | O.K. slight tack | Slight tack blistered | O.K. |
| 8'B | Same as 8'A | Wire Brushed | None | #55 Neoprene Brushing Cement | 5 Brush Coats | 8.9 | Same as 1A | O.K. poor adhesion | Slightly blistered | Bad blistering and loosening | O.K. tacky | O.K. slight tack | Coating detached | O.K. slight tack | Slight tack slight blistered | O.K. |
| 8'C | Same as 8'A | Wire Brushed | None | #55 Neoprene Brushing Cement | 10 Brush Coats | 16.5 | Same as 1A | O.K. poor adhesion | Some blistering | Some blistering and loosening | Tacky loss of adhesion | O.K. slight tack | Coating detached | O.K. slight tack | Slight tack slight blistered | O.K. |
| 9A | Same as 1A | Wire Brushed | None | #55 Troweling Compound plus 3 brush coats of #55 Cement | | 77.0 | Same as 1A | Coating completely detached | Coating completely detached | Coating completely detached | Coating completely detached | Coating completely detached | Coating completely detached | O.K. Poor adhesion | O.K. | O.K. |
| 9B | Same as 1A | Wire Brushed | 2 coats C-101 Same as 1A | Same as 9A | | 85.0 | Same as 1A | OK fair adhesion | OK | OK | Coating partially detached | Coating partially detached | Coating partially detached | O.K. fair adhesion | O.K. | O.K. |
| 9C | Same as 1A | Wire Brushed | 2 coats C-101 plus 2 coats C-84 | Same as 9A | | 80.0 | Same as 1A | OK fair adhesion | OK | OK | Coating partially detached | Coating partially detached | Coating partially detached | O.K. fair adhesion | O.K. slight tack | O.K. |
| 10A | Same as 1A | Sand blasted Same as 1A | None | Same as 9A | | 176. | Same as 1A | OK poor adhesion | OK | OK | Tacky loss of adhesion | Slight tack loss of adhesion | OK | OK Fair adhesion | O.K. slight tack | O.K. |

DUP030000949

| DESCRIPTION OF PANELS | | | | | | | | CONDITION AFTER 6 MONTHS IMMERSION | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | TANK NO. 1 | | | TANK NO. 2 | | | TANK NO. 3 | | |
| PANEL NO. | METAL | SURFACE PREPARATION | PRIMING MATERIAL | TOP COAT MATERIAL | NUMBER OF COATS | COATING THICKNESS (IN MILS) | VULCANIZATION CONDITIONS | GASOLINE VAPOR | GASOLINE LIQUID | SEA WATER LIQUID | SOUR NAPHTHA VAPOR | SOUR NAPHTHA LIQUID | SEA WATER LIQUID | SOUR CRUDE VAPOR | SOUR CRUDE LIQUID | SEA WATER LIQUID |
| 10B | Same as 1A | Same as 1A | 2 coats C-101 Same as 1A | Same as 9A | | 160. | Same as 1A | OK Good Adhesion | O.K. | O.K. | Tacky partially detached | Slight tack partially detached | O.K. | O.K. Good adhesion | O.K. slight tack | O.K. |
| 10C | Same as 1A | Same as 1A | 2 coats C-101 plus 2 coats C-84 | Same as 9A | | 160. | Same as 1A | OK Good adhesion | O.K. | O.K. | Tacky partially detached | OK slight tack | Partially detached | O.K. good adhesion | O.K. Very slight tack | O.K. |
| 14B | Same as 1A | Wire Brushed | 2 coats C-101 plus 2 coats C-84 | #55 Brushing Cement | 5 Brush Coats | 13.5 | Same as 1A | O.K. poor adhesion | O.K. | O.K. (better than 1B blister eliminated) | OK tacky poor adhesion | OK very slight tack | OK | OK tacky poor adhesion | Slight tacky slight blister | O.K. |
| 15B | Same as 1A | Sand blasted | Same as 14B | #55 Brushing Cement | 5 Brush Coats | 14.0 | Same as 1A | O.K. Good adhesion | O.K. | OK (better than 1A blister eliminated) | OK tacky fair to good adhesion | OK Very slight tack | OK | OK slight tack v.good adhesion | OK slight tack | O.K. |
| P-1-11 | New 1/8" Gauge Boiler Plate Steel | Sand blasted | 2 coats C-101 | #P-1 Formula | 5 Brush Coats | 7.5 | Same as 1A | OK Fair adhesion | O.K. | Slight blistering at water gasoline boundary | Tacky and blistered poor adhesion | OK Tacky | Slight Blistering | OK Tacky fair adhesion | Tacky blistered | O.K. |
| P-2-12 | New 1/8" Gauge Boiler Plate Steel | Sand blasted | 2 coats C-101 | #P-2 Formula | 5 Brush Coats | 7.5 | Same as 1A | OK Fair to good adhesion | O.K. | Slight blistering at water gasoline boundary | Tacky and blistered poor adhesion | OK slight tack | Considerable blistering | OK Tacky good adhesion | Tacky very slight blistery | O.K. |
| P-4-13 | New 1/8" Gauge Boiler Plate Steel | Sand blasted | 2 coats C-101 | #P-4 Formula | 5 Brush Coats | 10.0 | Same as 1A | OK Good adhesion | O.K. | Slight blistering at water gasoline boundary | Tacky slightly blistered Fair adhesion | OK | Blistered and loss of adhesion | OK slight tack Very good adhesion | O.K. Slight Tack | O.K. |
| P-5-14 | New 1/8" Gauge Boiler Plate Steel | Sand blasted | 2 coats C-101 | #P-5 Formula | 5 Brush Coats | 11.0 | Same as 1A | O.K. Good adhesion | O.K. | O.K. | O.K. Tacky fair adhesion | OK | Considerable blistering | O.K. Slight tack V.good adhesion | O.K. tack Light | O.K. |
| P-6-15 | New 1/8" Gauge Boiler Plate Steel | Sand blasted | 2 coats C-101 | #P-6 Formula | 5 Brush Coats | 14.0 | Same as 1A | O.K. Very good adhesion | O.K. | O.K. | Tacky and partially detached | Blistered and partially detached | Considerable blistering | O.K. no tack v. good adhesion | OK NO Tack | O.K. |
| P-7-16 | New 1/8" Gauge Boiler Plate Steel | Sand blasted | 2 coats C-101 | #P-7 Formula | 5 Brush Coats | 10.5 | Same as 1A | O.K. good adhesion | O.K. | O.K. | OK Tacky fair adhesion | O.K. | O.K. | OK No tack very good adhesion | OK No tack | O.K. |
| P-8-17 | New 1/8" Gauge Boiler Plate Steel | Sand blasted | 2 coats C-101 | #P-8 Formula | 5 Brush Coats | 11.0 | Same as 1A | O.K. Good adhesion | O.K. | Bad blistering and rusting | OK not tacky good adhesion | O.K. | Bad blistering and rusting | O.K. no tack good adhesion | No tack slight blistering | O.K. |

DUP030000950

| DESCRIPTION OF PANELS | | | | | | | | CONDITION AFTER 6 MONTHS IMMERSION | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | TANK NO. 1 | | | TANK NO. 2 | | | TANK NO. 3 | | |
| PANEL NO. | METAL | SURFACE PREPARATION | PRIMING MATERIAL | TOP COAT MATERIAL | NUMBER OF COATS | COATING THICKNESS (IN MILS) | VULCANIZATION CONDITIONS | GASOLINE VAPOR | GASOLINE LIQUID | SEA WATER LIQUID | SOUR NAPHTHA VAPOR | SOUR NAPHTHA LIQUID | SEA WATER LIQUID | SOUR CRUDE VAPOR | SOUR CRUDE LIQUID | SEA WATER LIQUID |
| P-9-18 | New 1/8" Gauge Boiler Plate Steel | Sand Blasted | 2 coats C-101 | #P-9 Formula | 5 Brush Coats | 14.0 | Same as 1A | OK Good adhesion | OK | Some blistering and rusting | Tacky and blistered | OK | Tacky and partially detached | O.K. no tack good adhesion | No tack slight blistering | O.K. |
| P-10-19 | New 1/8" Gauge Boiler Plate Steel | Sand blasted | 2 coats C-101 | #P-10 Formula | 5 Brush Coats | 12.5 | Same as 1A | OK Good adhesion | OK | OK | OK tacky good adhesion | OK | OK | OK No tack good adhesion | O.K. no tack | O.K. |
| P-11-20 | New 1/8" Gauge Boiler Plate Steel | Sand Blasted | 2 coats C-101 | #P-11 Formula | 5 Brush Coats | 12.5 | Same as 1A | OK Good adhesion | OK | OK (looks good) | OK tacky good adhesion | OK | OK | OK no tack good adhesion | OK No tack | O.K. |
| P-12-21 | New 1/8" Gauge Boiler Plate Steel | Sand blasted | 2 coats C-101 | #P-12 Formula | 7 Brush Coats | 13.5 | Same as 1A | OK good adhesion | OK | OK (gritty but in good condition) | OK tacky very good adhesion | OK | OK | OK no tack good adhesion | OK no tack | O.K. |
| P-13-22 | New 1/8" Gauge Boiler Plate Steel | Sand Blasted | 2 coats C-101 | #P-13 Formula | 7 Brush Coats | 12.5 | Same as 1A | OK good adhesion | OK | OK (gritty but otherwise OK) | OK tacky good adhesion | OK | OK | OK tacky good adhesion | OK tacky | O.K. |
| P-16-23 | New 1/8" Gauge Boiler Plate Steel | Wire Brushed | None | #P-16 Formula | 5 Brush Coats | 9.0 | Same as 1A | OK poor adhesion | OK | Bad blistering and loss of adhesion | Detached, film strength good | Loss of adhesion | Detached rusted | OK no tack fair adhesion | OK no tack slight embrittlement | O.K. |
| P-16-24 | New 1/8" Gauge Boiler Plate Steel | Sand Blasted | 2 coats C-101 | #P-16 Formula | 5 Brush Coats | 9.0 | Same as 1A | OK good adhesion | OK | OK | Detached and film embrittled | OK | OK | OK good adhesion | OK no tack | O.K. |
| P-17-25 | New 1/8" Gauge Boiler Plate Steel | Wire Brushed | None | #P-17 Formula | 5 Brush Coats | 12.5 | Same as 1A | OK poor adhesion | OK | Slight blistering and loosening | OK no tack poor adhesion | OK | Slight blistering | OK no tack fair adhesion | OK no tack | O.K. |
| P-17-26 | New 1/8" Gauge Boiler Plate Steel | Sand Blasted | 2 coats C-101 | #P-17 Formula | 5 Brush Coats | 11.5 | Same as 1A | OK fair to good adhesion | OK | OK | Slight blistering no tack fair adhesion | OK | Slight blistering | OK no tack Good adhesion | OK No tack | O.K. |
| 27-A | New 1/8" Gauge Boiler Plate Steel | Sand blasted | 2 coats C-101 | #55 Formula | 3 Spray Coats | 2.2 | Same as 1A | OK good adhesion | OK | Blistered particularly at water gasoline boundary | OK tacky good adhesion | OK | Blistered | OK good adhesion | Slight tack slight blistering | O.K. |
| 27-B | New 1/8" Gauge Boiler Plate Steel | Sand blasted | 2 coats C-101 | #55 Formula | 6 spray coats | 5.6 | Same as 1A | OK good adhesion | OK | Slight blistering at water gasoline boundary | OK tacky fair to good adhesion | OK | Slight blistering | OK Good adhesion | Slight tack v.slight tack | O.K. |
| 27-C | New 1/8" Gauge Boiler Plate Steel | Sand blasted | 2 coats C-101 | #55 Formula | 12 spray coats | 9.9 | Same as 1A | OK Good Adhesion | OK | OK | OK tacky fair adhesion | OK | Very slight blistering | OK good adhesion | OK Very slight tack | O.K. |

DUP03000951

| PANEL NO. | DESCRIPTION OF PANELS: METAL | SURFACE PREPARATION | PRIMING MATERIAL | TOP COAT MATERIAL | NUMBER OF COATS | COATING THICKNESS (IN MILS) | VULCANIZATION CONDITIONS | CONDITION AFTER 6 MONTHS IMMERSION — TANK NO. 1: GASOLINE VAPOR | TANK NO. 1: GASOLINE LIQUID | TANK NO. 1: SEA WATER LIQUID | TANK NO. 2: SOUR NAPHTHA VAPOR | TANK NO. 2: SOUR NAPHTHA LIQUID | TANK NO. 2: SEA WATER LIQUID | TANK NO. 3: SOUR CRUDE VAPOR | TANK NO. 3: SOUR CRUDE LIQUID | TANK NO. 3: SEA WATER LIQUID |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30 | New 1/8" Gauge Boiler Plate Steel | Wire brushed | 2 brush coats 373-759 Submarine Primer | 353-45003 Bakelite Red | 5 Brush Coats | 10.0 | No heat treatment air dried | Blistered good adhesion | Blistered | Blistered | Softened and partially detached | blistered | Slight blistering | OK Good adhesion | Considerable blistering | Considerable blister |
| 31 | New 1/8" Gauge Boiler Plate Steel | Sand blasted | 2 brush coats 373-759 Submarine Primer | 353-45003 Bakelite Red | 5 Brush Coats | 9.3 | No heat treatment Air dri-d | OK good adhesion | Blistered | Blistered | Slight softening slight blistering. | blistered | slight blistering | OK good adhesion | Blistered | Blistered |
| 32 | New 1/8" Gauge Boiler Plate Steel | Sand Blasted | None | 353-603 chlorinated rubber paint | 5 Brush Coats | 4.0 | No heat treatment Air dried | OK good adhesion | Blistered and wrinkled | Bad blistering | OK good adhesion | OK | Bad blistering and rusting | OK good adhesion | OK | OK |
| 33 | New 1/8" Gauge Boiler Plate Steel | Wire brushed | None | 353-603 chlorinated rubber paint | 5 Brush Coats | 5.2 | No heat trestment Air dried | OK good adhesion | Peeling and embrittled | Bad blistering | OK Good adhesion | OK | Bad blistering and rusting | OK good adhesion | OK | OK |
| 34 | New 1/8" Gauge Boiler Plate Steel | Wire brushed | None | 3 M Thiokol Cement EC-498 | 5 Brush Coats | 6.0 | No heat treatment air dried | OK good adhesion | Few blisters | Few blisters | Softened and blistered | Blistered | Blistered partially detached | OK good adhesion | OK | OK |
| 35 | New 1/8" Gauge Boiler Plate Steel | Sand blasted | None | 3M Thiokol Cement EC-498 | 5 brush coats | 3.6 | No heat treatment air dried | OK good adhesion | Blistered | Blistered and rusted | OK good adhesion | OK | Blistered and rusted | OK good adhesion | OK | OK |
| 38A | Old corroded and pitted steel from old Oil Tank | Wire brushed | 2 coats C-101 | #55 Neoprene Cement | 2 brush coats | 4.0 | Same as 1A | OK good adhesion | OK | General loosening of coating | OK tacky fair adhesion | OK | Blistered and partially detached | OK tacky fairly good adhesion | Blistered | Blistered |
| 38B | " " | Wire brushed | 2 coats C-101 | #55 Neoprene Cement | 6 brush coats | 11.0 | Same as 1A | OK good adhesion | OK | OK | Ok tacky fair to good adhesion | V slight blistering | Very slight blistering | OK fairly good adhesion | Slight tack slight blistering | Slight blistering |
| 38C | " " | Wire brushed | 2 coats C-101 | #55 Neoprene Cement | 10 brush coats | 22.0 | Same as 1A | OK fair to good adhesion | OK | OK | OK tacky poor adhesion | OK | OK | OK good adhesion | OK tacky | OK |
| 39A | " " | Sand blasted | 2 coats C-101 | #55 Neoprene Cement | 2 brush coats | 4.0 | Same as 1A | OK good adhesion | OK | blistered | OK tacky good adhesion | OK | Blistered and rusted | OK good adhesion | OK slight tack | OK |
| 39B | " " | Sand blasted | 2 coats C-101 | #55 Neoprene Cement | 5 brush coats | 11.0 | Same as 1A | OK good adhesion | OK | OK | OK tacky good adhesion | OK | OK | OK good adhesion | OK slight tack | OK |
| 39C | " " | Sand blasted | 2 coats C-101 | #55 Neoprene Cement | 10 brush coats | 22.0 | Same as 1A | OK good adhesion | OK | OK | OK tacky fair to good adhesion | OK | OK | OK good adhesion | OK slight tack | OK |

NOTE: Sea Water immersion less severe in case of sour crude because of some emulsification with the oil. Effect of sea water shown better in gasoline - sea water and sour naphtha-sea water immersion tests.

JPS:MCM
6/17/43

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