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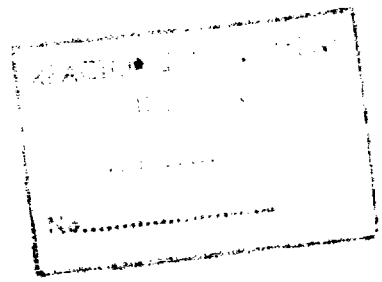
O.E.C.D. HIGH TEMPERATURE REACTOR PROJECT

DRAGON



Dragon Project Report

IMPREGNATION OF GRAPHITE SPECIMENS USING THE FURFURYL ALCOHOL IMPREGNATION PROCESS

by
R.A. MARTINA
O.J. VOHLER

(SIGRI KOHLEFABRIKATE GmbH, MEITINGEN, GERMANY)

A.E.E. Winfrith, Dorchester, Dorset, England

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ABSTRACT

This report gives the results of the furfuryl alcohol impregnation treatment of graphite fuel rods and end plugs done by Sigri Kohlefabrikate GmbH, Meitingen, from May 1962 till April 1964.

By impregnating the components two and three times, resp. the permeability was decreased, starting from a coefficient of about 5 x 10^{-2} $cm^2 sec^{-1}$, to a value of 10^{-6} - 10^{-7} $cm^2 sec^{-1}$. The rejects as occured with the first batches were finally diminished to a negligible amount by studying the single steps of treatment.

CONTENTS

PAGE NO.

TABLE

FIGURE

8.3.1 Relation Between Quantity of Catalyst and Precondensation Temperature (250 g Furfuryl Alcohol)

8.3.2 Dependence of Viscosity on Percentage of Catalyst and Quantity of Furfuryl Alcohol

IMPREGNATION OF GRAPHITE SPECIMENS

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1. INTRODUCTION

This concerns graphite fuel rods and end plugs of low permeability for the OECD High Temperature Reactor Project Dragon. Caused by the manufacturing process artificial graphite is a porous material and for this reason it has to be sealed by depositing secondary carbon in the pores. In this particular case this carbon was to be obtained by coking furfuryl alcohol resin in situ. As the theoretical carbon content of furfuryl alcohol is about 61 percent in weight and furthermore this is not obtainable in practice, it is not possible to fill the accessible pore volume completely with secondary carbon by one treatment; there are several impregnation treatments necessary followed by curing and baking.

This is the first time that the DRAGON impregnation process was to be used for treating series of full scale fuel rods. For the treatment penetration of the walls from inside was used. Specific equipment had to be developed for carrying out the impregnation process as well as the tests.

The graphite components were completely machined on receipt at Sigri Kohlefabrikate GmbH Meitingen and after the impregnation procedure and after testing they were shipped back to Winfrith.

2. IMPREGNANT

As already mentioned for the formation of resin, furfuryl alcohol was used furnished by The Quaker Oats Company, U.S.A. Monomeric alcohol is soluble in water and its viscosity is 4.78 cP at a temperature of 20°C. For the impregnation, precondensation of the alcohol is necessary, because the monomeric would cause cracking of the impregnated material if quickly condensed with phosphoric acid as a catalyst. For precondensation, furfuryl alcohol is mixed with the catalyst, i.e. phosphoric acid analytical grade with a specific gravity of 1.75, at a temperature of - 10°C, stirring intensively.

The impregnant is then slowly warmed up to room temperature and maintained in a water bath under continuous stirring at a temperature of 20°C until the required degree of condensation is reached. The degree of condensation is related to the viscosity of the liquid which should be 100 - 200 cP at that stage, as far as the first impregnation is concerned. (For the second and third impregnation monomeric furfuryl alcohol mixed with the catalyst was

used without precondensation.)

The measured viscosity of the partially condensed alcohol is, however, to be evaluated with caution, as the liquid is not homogeneous. The water formed by the condensation is insoluble yet in the dimeric furfuryl alcohol and is therefore dispersed in the liquid. After a certain time, larger droplets are being formed in the resting resin interfering with the measuring of viscosity. In order to obtain at least comparative values, samples were taken in accordance with a certain time schedule. Strict observance of this timing resulted in reproducible values, not representing though absolute values. Fig. 2.1 shows that the rate of viscosity increase is depending on the condensation temperature.

Furthermore it was found that condensation can be stopped or at least considerably reduced by cooling deeply. It was possible so - within reasonable limits - by selecting the appropriate condensation temperature to determine the time where to start impregnation. Fig. 2.1, line 2, illustrates the increase of viscosity at a condensation temperature of 18°C. In this case after 104 hours condensation was interrupted by cooling down to 2°C. From the 115th hour, temperature was slowly elevated to 18°C. Condensation commenced depending on the respective intermediate temperatures. A viscosity value of 100 cP was obtained with a retardation of 35 hours compared with a batch without interrupted condensation. This example shows the flexibility of the precondensation process. It was not possible, however, to reduce the condensation sufficiently when viscosity values exceeding 90 cP were involved.

Condensation was carried out in wide-necked flasks of ten l with mechanical stirrers. Nine l furfuryl alcohol were used for one batch, six l of which were first filled into the reaction flasks to be mixed with two percent by volume of phosphoric acid - based on the total quantity - at a temperature of - 10°C. During the dropwise addition of the phosphoric acid it is absolutely necessary to avoid that high concentrated phosphoric acid is localized as this would result in a quick local resinification of the alcohol.

The remaining three l of the furfuryl alcohol were then added quickly to the cold solution in order to accelerate warming up. Care must be taken that the mixture of furfuryl alcohol and catalyst is constantly stirred until it is used, as otherwise uncontrollable curing might be resulting. During impregnation itself no rise in temperature was detected within the graphite tubes.

3. IMPREGNATION

3.1 Components Received for Impregnation

The following specimens were sent to Sigri for impregnation:

617 fuel rods	75 of these intended for the seven element rig. The first consignment received contained 70 rods in Dragon Grade 6 graphite material, while all other material received later on was in Dragon Grade 9 (see Tables 3.1.1 - 3.1.11).
575 long end plugs	66 of these intended for the seven element rig. The first consignment received contained 64 long end plugs in Grade 6 material (see Tables 3.1.12 - 3.1.17).
166 short end plugs	16 of these intended for the seven element rig. The first consignment received contained 12 short end plugs in Grade 6 material (see Tables 3.1.18 - 3.1.22).

3.2 Equipment for Impregnation

For impregnating the components, as already mentioned, the resin was pressed through the wall of the graphite tubes from the inside to the outside. To this purpose, Sigri developed special clamping devices, permitting to get tight hold of tubes and end plugs, fill them with furfuryl alcohol, and subjecting them subsequently to gas pressure. Fig. 3.2.1 shows such an impregnation device. This method permitted simultaneous impregnation of four tubes or - in other units - of ten long or short end plugs, resp.

3.3 First Impregnation

Precondensed furfuryl alcohol was used for the first impregnation. Condensation products of a wide molecular spectrum are being formed as a result of condensation with phosphoric acid. The water formed by condensation which remains in the reaction mixture, as is known, is acting as precipitant for the components of higher molecular weight, so that part of the resin is filtrated off, as it can no longer soak into the pores during impregnation. The fine pores absorb preferentially condensation water and the resin content of lower molecular weight. No difficulty occurred due to the particular pore structure of the used graphite, i.e. Dragon Grades 6 and 9. On the other hand a high number of rejects during curing and baking had to be expected for certain other graphite grades.

This filtering effect explains positively the phenomenon that the permeability of the impregnated tubes increases considerably from the inside to the outside.

The impregnant is pressed from the inside to the outside, the inner surface zone is sealed due to the high molecular components producing a high carbon gain. The gases evolved by coking take their way preferredly to the outside so that the inner shell is responsible for the sealing effect. As initially spallings and ruptures occurred, a complete filling of the accessible pores of the material proved to be unsuccessful. As a result of it, the first impregnation step was then considered to be finished when half of the flats of the rods were penetrated with liquid. Wetting of half of the conical part of the end plugs proved to result in a satisfactory impregnation.

During the first impregnation the resin absorbed was eight to ten per cent by weight, related to the initial weight of tube or end plug.

3.4 Second and Third Impregnation

Neither the second impregnation, using monomeric furfuryl alcohol mixed with two per cent by volume of phosphoric acid, was performed until full penetration of the material. Specifications provided generally an impregnation period of seven hours. In the course of work this period turned out to be too long with respect to the fuel rods. A series of damages occurred which could be eliminated by decreasing the impregnation period of the rods to five hours. The impregnation period for the end plugs remained unchanged, i.e., seven hours.

3.5 Cleaning of the Impregnated Material

Initially, great difficulties were experienced in cleaning the tubes after the first impregnation as the portions of higher molecular weight, as mentioned, were filtered off, covering the inside of the tubes in the form of a thick, tough mass. Out of various mechanical cleaning methods tried out, that using a TFE plug fitting tightly into the tube, proved to be the best one for removing the resin even from those sections not easily accessible. One side of the fuel rod shows considerable, partly threaded reductions in diameter; these sections are cleaned using special TFE scrapers.

During curing a small portion of the resin is released again from the pores to form hard crusts on the surface not to be removed easily. To avoid this, it proved useful to wash the impregnated and cleaned graphite specimens using a small quantity of monomeric furfuryl alcohol. This removes the impregnant from the pores on the surface, and exuding does not occur again.

If another solvent, acetone for instance, would be used instead of furfuryl alcohol, too much of the resin were washed out and the permeability decrease after

baking were considerably smaller.

4. CURING

It is not possible to subject the resin - placed into the pores at 100 to 200 cP - to immediate thermosetting, as the condensation water liberated suddenly from the low molecular portions would spall the graphite material. Storage for at least 24 hours at room temperature permits to advance the condensation in such a degree that ruptures can be eliminated.

The following scheme in accordance with the given specifications was used for curing:

hold	at	60°C	for	2 hours
"	"	80°C	"	2 hours
"	"	100°C	"	2 hours
"	"	120°C	"	15 hours
"	"	150°C	"	2 hours
"	"	200°C	"	2 hours
				25 hours

Curing of tubes and end plugs - without filler material - was first done in a curing furnace with air circulation. But it proved that the electrically heated shaft furnaces used for baking the impregnated material, permitted precise regulation even at lowest temperatures. From that date the resin was cured and baked in a single step. The use of graphite grains crushed to a particle size of one to five mm avoided forming of crusts during curing and baking. Small amounts of resin, exuded in spite of cleaning and treatment during curing, are absorbed by the filler grains. It is easy then to remove mechanically the grains sticking loosely to the surface.

5. BAKING

5.1 Baking Method

After impregnation and cleaning, the components were baked in electrically heated shaft furnaces. Only the very first batches were cured and baked in separate curing and shaft furnaces, respectively. Then, the material covered with loose graphite grains was cured and subsequently baked in the same shaft furnace. The heating of the baking process was so programmed that the temperature rised from 200°C to 650°C with an hourly increase of 5°C. At 650°C to 1000°C the heating rate was 50°C/h.

The fuel rods and the end plugs were embedded into the steel saggers in vertical position, the end plugs additionally in special graphite crucibles (see Fig. 5.1.1). Graphite grains with a particle size of one to five mm, of purest nuclear grade were used as filler

material. To protect the specimens against oxidation the sagger was covered with a layer of cured resin with a grain size of 5 to fifty mm. The use of a finer crushed material was abandoned as it caused spontaneous ignition of the resin due to the active surface which had formed.

Only a small amount of resin from the cover was lost by oxidation during a baking cycle so that sufficient protection of the impregnated material against oxidation was given.

It was relatively easy to remove mechanically the resin which exuded during curing and was carbonized on the surface. The inside of the tubes was cleaned with tightly fitting scrapers of sheet material and plastics.

5.2 Breakage During Curing and Baking

The above mentioned curing and baking procedures give optimum results, i.e., highly reduced permeability at a very small number of rejects depending on fulfillment of certain conditions as homogeneity of the material and appropriate pore filling during impregnation treatment. For instance, the Grade 6 material of the first consignment in particular exhibited serious inclusions and faults in structure (see Figs. 5.2.1 to 5.2.4) and had a particular high number of rejects.

Furthermore complete filling of the accessible pores of the material during the first impregnation or periods exceeding highly the time limit of the second treatment, the latter resulting also in a more complete impregnation, produced spallings or breakage of the components. By adopting the appropriate means it has been possible to reduce the number of breakages considerably (see Figs. 5.2.5 to 5.2.7).

The treatment of the first consignment - cured still in a separate step - reveals that breakages occured during curing and not during baking. With the components out of the following consignments where a smaller amount of resin pick-up was considered to be satisfactory, a very small number of breakages occured during curing and baking carried out in a single step.

The diagramm showing the amount of broken material is limited to components damaged by the process and does not mention those occurred by handling etc. Breakages due to improper handling are marked "R" (reject) on the Tables 3.1.1 - 3.1.22.

6. RESULTS OF IMPREGNATION

6.1 Differences Between Grade 6 and Grade 9 Material

Fuel rods and end plugs made of Dragon Grade 6 are not intended for use in the reactor but for tests only. As may be seen from Tables 3.1.1 - 3.1.22 the components from each consignment vary widely in behaviour and properties. Thus, for instance, a high number of rejects occurred caused by bursting in part when the material was subjected to the first pressure test, as in the case of the fuel rods from the 6th consignment.

Furthermore, there is a fundamental difference between material Grade 6 and Grade 9. It appears in this respect that a higher residue is obtained from curing of impregnated Grade 6 material than compared with Grade 9 material at the same amount of resin pick-up. Moreover, Grade 6 material seems to be more active for the adsorption of gases and liquids due to its pore structure as becomes obvious during outgassing of the specimens.

Thus the coefficient of permeability in the impregnated Grade 6 material - determined by the vacuum decay method with an apparatus as shown in Fig. 6.1.1 - depends in a considerably higher degree on the preceding pumping time than in the Grade 9 components. In the case of Grade 9 fuel rods an almost constant coefficient of permeability is obtained after so short a pumping time as 4 hours that reduces only slightly after further pumping, as illustrated in Figs. 6.1.2 and 6.1.3. These results are up against those obtained in the case of Grade 6 material, as shown in Figs. 6.1.4 to 6.1.6.

Moreover, components of Grade 6 material exhibited a series of inclusions or faults in structure which resulted in bursting or spalling during heat treatment. The resin collected preferredly in such regions and the material was split by pyrolysis gases. Segregations are obvious from Figs. 5.2.1 - 5.2.3 and a fault in structure from Fig. 5.2.4 which latter caused spalling due to furfuryl alcohol collection.

6.2 Relation Between Weight and Permeability in the Original State

In Figs. 6.2.1 to 6.2.5 the relationship between original permeability and original weight is illustrated separately as to fuel rods and long and short end plugs.

At first sight it would appear that there is no unique relation, i.e. if the values of all consignments are considered as a whole. But, referring to each consignment separately, it becomes obvious that there

is a very good linear dependence of the weight on the permeability of all components of each consignment: Permeability decreases with the increase of the component weight.

Components taken from the same consignment show a very small deviation, but these relations are different for the various consignments; they are shifted against each other in parallel, so an impression of high irregularily is given, when considered as a whole. Furthermore, components of Grade 6 material and components for the seven element rig experiment take an exceptional position. The components made of Grade 6 are more permeable than those of Grade 9 at the same weight and the components for the seven element rig show the lowest weight in the original state at comparable permeability.

6.3 Dependence of Resin Uptake on Permeability and Bulk Density

Figs. 6.3.1 - 6.3.3 illustrate the resin uptake during the first impregnation as a function of the original coefficient of permeability. Distinction must be made between resin uptake of fuel rods and that of long and short end plugs. Most of the fuel rods pick-up between 7 and 10% by weight of resin, only the rods of the last two consignments show a resin uptake less than 7 %; whereas the pick-up of the end plugs is 4 % to 10%.

Another striking feature of these end plugs is the greater deviation of the values which might, however, be due to the breaking off of impregnation when resin penetration of a certain area had come about.

Unlike the relationship "original permeability to original weight", the values of the function resin uptake to original permeability are found to be within a very narrow range of deviation. This may be due to the fact that the original weight includes the sealed pores as well, while the resin uptake is determined from the accessible pores only. Hence, the accessible pore volume is very similar in the case of materials from various consignments, but the volume of sealed pores appears to be variant.

The end plugs for the seven element rig experiment are an exception to this. Their resin uptake varies widely at same permeability. It may be concluded from the diagram that though the material has at least the same number of pores going through, it has a smaller number of accessible pocket pores, compared with components from other consignments.

6.4 Change of Permeability

The normal components supplied to Sigri have shown

the usual permeability of 10^{-2} cm^2 sec^{-1}. Only some of the rods had a permeability coefficient of 10^{-1}, and 10^{-3} cm^2 sec^{-1}, respectively. A great number of fuel rods provided for the seven element rig had, however, a permeability coefficient exceeding 1×10^{-1}.

The first impregnation entailed a decrease of the permeability coefficient to 10^{-4} - 10^{-5} cm^2 sec^{-1}, determined by the pressure decay method. But only 10 % of the components were measured for permeability after their first impregnation.

During second impregnation the resin uptake is very low and varies widely and therefore the obtained values are not suitable for evaluation. It has been attempted to derive a relation between the permeability values in the original state and those after the second impregnation and baking. It was seen, however, that the initial permeability is not a criterion for a certain value determined after second impregnation. This may be explained by the fact that the accessibility of the pores is varied irregularly during the first impregnation treatment and that this effect is even increased by a further impregnation.

After two impregnations the optimum values of the coefficient of permeability are about 1×10^{-8} cm^2 sec^{-1}, the highest are about 1×10^{-3} cm^2 sec^{-1}, and the average coefficient of permeability is about 10^{-5} to 10^{-6} cm^2 sec^{-1}, measured by the pressure decay method. The same rods measured by the vacuum decay method show, however, a coefficient of about 10^{-6} to 10^{-7}, in some cases 10^{-8} cm^2 sec^{-1}. These values were obtained when the components were measured after a pumping time of four hours.

Those components were subjected to a third impregnation the permeability of which was higher than the following values, with respect to:

a) Pressure decay method: 1×10^{-5} cm^2 sec^{-1}. Components with values exceeding this limit are subjected to the third impregnation without previous measuring by vacuum decay method.

b) Vacuum decay method: 5×10^{-7} cm^2 sec^{-1}.

The last figure was valid until 13th December, 1962, whereupon the limit was refixed to be now as follows:

$$1 \times 10^{-6} \text{ cm}^2 \text{ sec}^{-1}.$$

During third impregnation quite varying results were obtained at a resin uptake practically not measurable,

as may be seen from Tables 3.1.1 - 3.1.22. In the case of components with coefficients of permeability exceeding about 5×10^{-5}, the coefficient was decreased by two orders of magnitude during the third impregnation. In the case of components where the permeability was less than about 1×10^{-6} cm^2 sec^{-1} even an increase of the coefficient was stated in part.

It may be assumed that the increase in permeability is due to the rupture of thin coke membranes within the pores during baking. After appropriate tests it did not prove true as assumed first, that the highly reactive resin coke corrodes by attack of atmospheric oxygen during the cooling period in the furnace. For this reason the normal packing material in the furnace was covered with a layer of cured resin. Furthermore, the effective cross section for the access of atmospheric oxygen was diminished by the use of appropriate sheet metal inserts. Another baking cycle was carried out using nitrogen purified over copper (BTS catalyst). But, also during these treatments an increase in permeability occurred. In order to be on the safe side, the cover of cured resin was maintained, though, but further investigations using nitrogen were not carried out.

7. TESTING AND INSPECTION

7.1 Pressure Test Before Impregnation

Prior to impregnation the components were subjected to a pressure test at 8.1 at.abs. Simultaneously, the coefficient of permeability was determined by pressure decay method. As the working pressure applied for impregnation was 8 at.abs. only, the testing pressure was slightly higher. Bursting occurring during this pressure test is due to faults in material, at least as far as material from the first consignment (Dragon Grade 6) is concerned. While in the case of material from the last received consignments which was subjected to pressure tests after its machining with Graviner, Gosport, part of the burstings were apparently due to internal damage caused during transport.

7.2 Permeability Measurements and Pressure Tests After the Single Impregnation Steps

After first baking, permeability measured by pressure decay method was determined on only 10 % of the components, but, as a matter of safety, all components were subjected to pressure tests, as done before their first impregnation. Second and third baking were also followed by pressure testing. After the second baking the components were first measured by pressure decay method. A third impregnation was carried out if the K-value was exceeding 1×10^{-5} cm^2 sec^{-1}, in accordance with the specifications described in chapter 6.4. If a lower permeability value was obtained than mentioned above, a subsequent vacuum decay measuring was to decide whether

the components should be subjected to a further treatment (see chapter 6.4.).

An exception was made in the case of the components intended for the seven element rig where the limit was agreed to be 2 x 10^{-5} cm^2 sec^{-1}, vacuum decay measured. At the time when this was agreed, part of the material was already subjected to a third impregnation though - in accordance with the usual requirements - so that also components with a lower permeability than 2 x 10^{-5} were subjected to a third impregnation.

8. INVESTIGATIONS OF IMPREGNANT

8.1 Condensation with Phosphoric Acid

Though a high sealing effect is obtained even during first impregnation by precondensation of furfuryl alcohol using the catalyst phosphoric acid, according to the given specification, it is not possible, however, to increase working life to such a degree that one batch can be used for a greater number of impregnations; a new reactant must be used for each impregnation. Naturally, the phosphoric acid can be washed out using alkaline salts, but, it is difficult to separate the individual layers and it takes much time. Experiments carried out with carbamide addition in order to improve pot life resulted in a higher number of rejects. Therefore, other ways had been tried out for precondensation.

8.2 Condensation with γ-Aluminum Oxide

Condensation of furfuryl alcohol employing aluminum oxide is known from literature [1] . In this patent it is particularly stressed that only the γ form has catalytic effect. Analysis carried out with purest commercial γ-aluminum oxide were, however, not successful. Only one specimen of alumina resulted in satisfactory condensation. During preparation of this compound only part of the aluminum hydroxide precipitate had been washed out and as a result it contained chlorine ions. The γ-aluminum oxide obtained from this batch by heating up to a temperature of 800°C showed acid reaction. γ-aluminum oxide generated from completely washed out aluminum hydroxide was not catalytically effective. A further batch using "aluminum oxide for chromatographic analysis, acidic", a product from Merck, resulted also in condensation. Hence, not the γ form of aluminum oxide is of catalytic effect but its acidic components.

For condensation 10 % of aluminum oxide are added to the furfuryl alcohol whereupon the mixture is heated up to boiling temperature of the alcohol. As soon as condensation has started, an azeotropic mixture of alcohol and water distilled over and was recirculated into the reaction flask. After some time the individual layers of the condensate proceed to separate. This occurs as soon as dimeric alcohol - no longer soluble in water - distils over.

With the aid of the amount of water distilled off, progress of condensation can be pursued. It has been found that there is a relation between this quantity and the viscosity of the resin, as illustrated in Fig. 8.2.1. As will be seen from this diagram, the curve of viscosity becomes rather steep when 0.48 moles of water are distilled off. Hence, it appears to be advisable to stop condensation after 0.48 moles are reached, as otherwise close control of viscosity would no longer be possible if larger quantities were involved. At this stage, precondensation has made great progression, as will be seen from the following experiments. After 0.87 moles of water were given off, the product was as hard as stone. It was possible to remove max. 0.87 from the two atoms of oxygen present in the furfuryl alcohol molecule, using mild conditions - with the aid of xylene addition for the azeotropic destillation of water during condensation of alcohol, treated in accordance with the specifications. It follows that about 1.2 atoms are bound to be split off during carbonization, partly at the expense of carbon. This explains also that the carbon gain is only about 80 % compared to the theoretic yield (theoretic yield related to furfuryl alcohol is 61.2 wt.%, the value obtained actually 50-54 wt.%).

During storage, viscosity of the condensation product obtained via aluminum oxide increases only slightly, whereas it is even decreased slightly in some batches. This is due to the fact that also higher molecular compounds, in suspension, are produced during condensation; they are in suspension and shift the viscosity measuring in the direction of higher values. As soon as these products have deposited in the form of a thin sludge layer on the ground of reaction flask, a smaller viscosity value is obtained for the remaining liquid.

The higher molecular compounds covering the catalyst are interferring highly with the separation. The still hot furfuryl alcohol - in which the catalyst was partly disperged - requires filtering. The remaining aluminum oxide is considerably caked with resin and must be treated with solvents before its reuse. As this is rather elaborate another condensation method was searched for.

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[1] NIELSEN E.R., U.S.-Patent 2 681 896, "Furfuryl Alcohol Condensate", appl. Oct. 18, 1952, pat. June 22, 1954

8.2.1 Impregnation Experiments with Furfuryl Alcohol Precondensated According to Item 8.2

The catalyst used was 1 vol% phosphoric acid. This had to be added to the precondensate under heavy stirring. This work required some caution and care.

Sample components of Dragon Grade 9 material were impregnated based on the specified process. The gain in permeability decrease was in the same order of magnitude as the values obtained with the impregnant precondensed with phosphoric acid. After one impregnation step, the samples showed coefficients of permeability from 1 to 2.5 x 10^{-4} cm^2 sec^{-1}. Surface curing carried out in compliance with known processes resulted in additional gain. After first impregnation and surface curing, the permeability coefficient measured on samples from same series was in the order of 5 - 8 x 10^{-6} cm^2 sec^{-1}. While such values were obtained only by a second impregnation according to the Dragon process.

8.3 Condensation with Sulphuric Acid

Precondensation of furfuryl alcohol using diluted sulphuric acid is known from literature [2] , where it is indicated, however, that lacquer raw materials are resulting, and for this reason condensation is carried out there up to a viscosity of about 1000 cP.

Therefore it was tried to moderate the process to be suitable for graphite impregnation purposes. This revealed the phenomena that the grade of acid concentration given in literature was far too low for small reactants (250g of furfuryl alcohol).

Figs. 8.3.1 - 8.3.2 illustrate the relation between sulphuric acid concentration and obtained viscosity with regard to various reactant quantities. As will be seen, it is practically impossible to control small quantities analogously. The values show a rather wide dispersion.

It must be admitted, however, that the resulting product is of excellent quality. After removing of the well dispersed condensation water, a completely clear, viscous liquid of dark read-brown colour is given, not containing any resin compound of higher molecular weight. Rough separation from the diluted sulphuric acid is easy and done within shortest time.

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[2] KAESMACHER H., "Herstellung und Anwendung von Furanharzen aus Furfurylalkohol", Kunststoff-Rundschau 7 (1960), 77-82, 117-121, 265-268.

8.3.1 Impregnation Experiments with Furfuryl Alcohol Precondensated According to Item 8.3

Impregnation experiments with subsequent surface curing resulted in a permeability coefficient of about 5 x 10^{-6} cm^2 sec^{-1} reached during one step only. 1 % phosphoric acid was added as catalyst (see chapter 8.2.1).

Surface curing fails if carried out on material impregnated with furfuryl alcohol precondensed in accordance with the Dragon process; in this case the components burst during curing and baking, due to the fact that here the pores are filled primarily with portions of lower molecular weight and condensation water. Surface hardening keeps the gases from escaping and high pressures are arising, which cause spalling or even bursting of the material.

Furfuryl alcohol condensed via aluminum oxide or sulphuric acid does not contain any compounds of lower molecular weight and, furthermore, a very small amount of condensation water preventing that high pressures occur, which result in splitting of the material.

9. SUMMARY

In connection with the Contract under report, the following components were made largely impermeable by furfuryl alcohol impregnation:

617 fuel rods,
575 long end plugs, and
166 short end plugs.

Careful study of the individual steps of the impregnation process permitted that this treatment of the fully machined components resulted in a very low number of rejects due to damage or bursting - except material from the consignment received first.

The first impregnation - using precondensated furfuryl alcohol which contained phosphoric acid as catalyst, in accordance with specification - resulted in a decrease of the coefficient of permeability to 10^{-4} to 10^{-5} cm^2 sec^{-1}. By the second impregnation the permeability was decreased to 10^{-5} to 10^{-6}, pressure decay measured. When the vacuum decay method was used for measuring, the coefficient of permeability was about 10^{-6} to 10^{-7} cm^2 sec^{-1}. The third impregnation accomplished further noticeable decrease in general only in the case of components with a coefficient of permeability exceeding about 5×10^{-5} cm^2 sec^{-1}.

Apart from phosphoric acid, applicability of other catalysts for precondensation was studied, e.g. use of aluminum oxide or sulphuric acid. The advantage of these catalysts is a condensation product of a relatively homogeneous molecular weight distribution permitting additional surface curing of the impregnated components. It was possible in this way to decrease the coefficient of permeability of Dragon Grade 9 samples to about 5×10^{-6} cm^2 sec^{-1} by one single impregnation step.

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Table 3.1.1

Fuel Rods (1st Delivery)

No.	Original			First Impregnation								Second Impregnation						
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Polym.-Content %	Carbon Yield %	Sec. Carb. Cont. %	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin-Uptake %	Polym.-Content %	Carbon Yield %	Sec. Carb. Cont. %	Permeability, cm^2sec^{-1} (Press. Dec.)	(Vac. Dec.)	Remarks
0001	5147.2	4.8×10^{-2}	-	136	175	8.46	7.92	-	-	-	2	-	-	-	-	-	-	-
0002	5113.1	9.6×10^{-2}	-	136	175	9.07	8.14	50.6	4.59	2.5×10^{-4}	1	1.01	0.84	45.7	0.462	3.0×10^{-6}	5.7×10^{-7}	-
0003	5110.0	9.9×10^{-2}	-	136	175	8.94	7.84	51.1	4.57	3.2×10^{-4}	-	0.93	0.77	45.2	0.421	6.3×10^{-6}	3.1×10^{-7}	-
0004	4964.5	19.5×10^{-2}	-	136	175	10.14	9.10	50.8	5.15	7.0×10^{-4}	-	2.38	2.18	-	-	-	-	3
0005	5106.0	16.2×10^{-2}	-	136	175	8.97	7.98	50.9	4.57	8.1×10^{-4}	-	1.28	1.10	-	-	-	-	2
0006	5193.0	5.3×10^{-2}	-	136	175	8.11	7.41	51.9	4.21	2.0×10^{-4}	-	0.83	0.66	44.8	0.372	2.4×10^{-6}	3.8×10^{-7}	-
0007	5124.6	8.2×10^{-2}	-	136	175	8.46	7.32	50.2	4.26	2.5×10^{-4}	-	0.5	0.36	44.6	0.203	5.0×10^{-6}	6.4×10^{-7}	-
0008	5043.5	13.8×10^{-2}	-	136	175	9.59	8.42	50.8	4.88	6.1×10^{-4}	-	2.94	2.79	-	-	-	-	2
0009	5151.2	burst at 2.1 ata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0010	5143.6	5.3×10^{-2}	-	189	225	8.71	8.52	50.5	4.40	5.9×10^{-5}	-	0.46	0.32	43.2	0.199	2.3×10^{-6}	4.7×10^{-7}	-
0011	5045.3	12.6×10^{-2}	-	210	107	10.1	9.1	-	-	-	2	-	-	-	-	-	-	-
0012	5112.6	9.5×10^{-2}	-	216	89	9.02	7.43	49.2	4.44	1.1×10^{-3}	-	0.48	0.29	26.4	0.127	3.0×10^{-5}	-	-
0013	5133.9	8.6×10^{-2}	-	216	89	9.05	7.36	51.4	4.65	6.3×10^{-4}	-	0.37	0.22	22.1	0.085	5.3×10^{-5}	-	1
0014	5168.0	5.2×10^{-2}	-	156	190	8.27	7.42	49.3	4.08	1.6×10^{-4}	-	0.44	0.28	37.8	0.166	3.8×10^{-6}	4.2×10^{-7}	-
0015	5149.9	5.1×10^{-2}	-	189	225	8.44	7.61	49.7	4.20	3.2×10^{-5}	-	0.30	0.22	51.5	0.155	2.5×10^{-6}	4.8×10^{-7}	-
0016	5194.3	5.7×10^{-2}	-	156	190	7.44	6.42	49.2	3.56	2.5×10^{-4}	-	0.52	0.35	41.0	0.213	2.9×10^{-6}	8.0×10^{-7}	-
0017	5253.9	2.7×10^{-2}	-	189	225	7.45	6.94	49.6	3.70	1.9×10^{-5}	-	0.29	0.16	35.4	0.102	broken at 5.2 ata		
0018	5166.9	5.8×10^{-2}	-	210	107	7.99	7.41	52.4	4.14	1.1×10^{-4}	-	0.33	0.13	3.3	0.001	8.8×10^{-5}	-	-
0019	5088.9	8.2×10^{-2}	-	189	225	9.23	8.25	51.4	4.74	2.6×10^{-4}	1	1.33	1.07	41.9	0.557	-	-	2
0020	5110.8	10.5×10^{-2}	-	210	107	9.87	8.92	50.6	5.0	3.3×10^{-5}	-	1.01	0.85	-	-	-	-	2
0021	5157.3	6.6×10^{-2}	-	210	107	8.38	7.66	51.4	4.31	7.0×10^{-5}	-	0.48	0.29	43.0	0.206	2.7×10^{-6}	5.2×10^{-7}	-
0022	5141.1	9.9×10^{-2}	-	189	225	9.16	8.08	50.3	4.61	2.4×10^{-4}	-	1.97	1.86	-	-	-	-	3
0023	5189.4	3.6×10^{-2}	-	210	107	5.40	7.60	-	-	-	2	-	-	-	-	-	-	-
0024	5147.3	10.9×10^{-2}	-	210	107	8.75	7.89	52.2	4.57	1.9×10^{-4}	-	0.81	0.68	42.3	0.343	2.4×10^{-6}	5.8×10^{-7}	-
0025	5177.5	4.0×10^{-2}	-	136	175	7.79	7.12	50.0	3.41	-	crack	-	-	-	-	-	-	-
0026	5092.1	9.5×10^{-2}	-	136	175	8.87	8.07	-	-	-	2	-	-	-	-	-	-	-
0027	5006.7	14.2×10^{-2}	-	136	175	10.34	9.34	51.0	5.28	2.7×10^{-4}	-	0.60	-	38.5	0.231	2.0×10^{-6}	4.4×10^{-7}	-
0028	5074.5	9.5×10^{-2}	-	136	175	9.29	8.47	50.8	4.72	1.6×10^{-4}	-	0.48	0.35	-	-	-	-	2

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Table 3.1.1 (Continued)

Fuel Rods (1st Delivery)

No.	Original			First Impregnation								Second Impregnation						
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Polym. Content %	Carbon Yield %	Sec. Carb. Cont. %	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin-Uptake %	Polym.-Content %	Carbon Yield %	Sec. Carb. Cont. %	Permeability, $cm^2 sec^{-1}$ (Press. Dec.)	Permeability, $cm^2 sec^{-1}$ (Vac. Dec.)	Remarks
0029	5263.6	burst at 7.8 ata			-	-	-	-	-	-	-	-	-	-	-	-	-	-
0030	5242.6	3.0×10^{-2}	-	136	175	7.42	5.85	-	-	-	2	-	-	-	-	-	-	-
0031	4998.5	burst at 6.5 ata	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
0032	5145.0	burst at 2.5 ata	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
0033	5065.1	11.6×10^{-2}	-	141	89	9.46	8.44	51.9	4.91	1.4×10^{-4}	-	0.29	0.22	23.8	0.069	2.0×10^{-5}	-	-
0034	5046.5	12.9×10^{-2}	-	136	175	9.52	8.54	51.8	4.93	-	3	-	-	-	-	-	-	-
0035	5157.1	7.5×10^{-1}	-	141	89	8.10	6.91	51.8	4.20	1.1×10^{-4}	-	0.21	0.18	17.9	0.037	1.8×10^{-5}	-	-
0036	5166.3	burst at 2.4 ata	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
0037	5070.5	10.7×10^{-2}	-	141	89	9.30	8.48	51.6	4.80	1.2×10^{-4}	-	0.49	0.26	28.4	0.139	1.6×10^{-5}	-	-
0038	5234.5	2.9×10^{-2}	-	141	89	7.22	6.05	51.6	3.72	2.2×10^{-5}	-	0.50	0.05	2.3	0.001	6.2×10^{-6}	4.5×10^{-6}	-
0039	5164.0	6.0×10^{-2}	-	136	175	8.31	7.71	-	-	-	2	-	-	-	-	-	-	-
0040	5075.5	6.0×10^{-2}	-	136	175	8.86	8.00	49.7	4.40	6.2×10^{-5}	1	0.29	0.18	-	-	-	-	2
0041	5153.2	burst at 2.7 ata	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
0042	5154.9	7.7×10^{-2}	-	156	190	8.12	6.88	49.0	3.99	4.5×10^{-4}	-	0.7	0.55	43.6	0.305	2.3×10^{-6}	1.0×10^{-6}	-
0043	5003.5	16.2×10^{-2}	-	351	103	10.06	8.76	49.4	4.97	6.1×10^{-4}	-	2.70	2.55	-	-	-	-	2
0044	5122.1	burst at 4.0 ata	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
0045	4984.6	18.9×10^{-2}	-	210	107	10.86	9.63	50.5	5.49	2.5×10^{-4}	-	1.25	1.07	-	-	-	-	2
0046	5059.7	burst at 2.6 ata	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-
0047	5106.2	8.7×10^{-2}	-	189	225	8.96	7.96	51.3	4.60	3.4×10^{-4}	-	0.85	0.62	38.1	0.324	2.7×10^{-6}	3.5×10^{-7}	-
0048	5167.6	5.7×10^{-2}	-	156	190	8.04	7.05	48.6	3.92	1.1×10^{-4}	-	0.32	0.19	40.5	0.130	2.4×10^{-6}	3.7×10^{-7}	-
0049	5111.5	10.1×10^{-2}	-	156	190	9.11	7.96	49.7	4.53	3.9×10^{-4}	-	0.68	0.58	41.4	0.282	3.3×10^{-6}	5.7×10^{-7}	-
0050	5133.1	8.5×10^{-2}	-	156	190	8.37	7.28	49.6	4.16	3.5×10^{-4}	-	0.64	0.48	41.8	0.268	2.5×10^{-6}	6.6×10^{-7}	-
0051	5136.6	7.6×10^{-2}	-	189	225	8.32	7.70	-	-	-	3	-	-	-	-	-	-	-
0052	5083.4	10.7×10^{-2}	-	210	107	9.75	8.67	51.0	4.97	1.4×10^{-4}	-	0.98	0.82	3.03	0.297	4.9×10^{-6}	2.9×10^{-7}	-
0053	5042.1	13.8×10^{-2}	-	351	103	10.44	9.14	50.3	5.25	4.0×10^{-4}	-	0.99	0.79	45.4	0.449	3.6×10^{-6}	9.7×10^{-7}	-
0054	5052.5	11.8×10^{-2}	-	210	107	9.11	8.21	50.8	4.63	8.5×10^{-4}	-	1.13	0.96	45.0	0.509	3.1×10^{-6}	4.4×10^{-7}	-
0055	5202.1	5.3×10^{-2}	-	136	175	7.81	7.09	50.4	3.94	5.9×10^{-5}	-	0.27	0.16	35.4	0.095	3.1×10^{-6}	5.6×10^{-7}	-
0056	5173.3	5.2×10^{-2}	-	136	175	8.31	7.61	-	-	-	2	-	-	-	-	-	-	-
0057	5137.4	8.5×10^{-2}	-	156	190	8.31	7.25	48.3	4.02	3.3×10^{-4}	-	0.80	0.66	-	-	-	-	2

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Table 3.1.1 (Continued)

Fuel Rods (1st Delivery)

No.	Original			First Impregnation								Second Impregnation						
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Polym. Content %	Carbon Yield %	Sec. Carb. Cont. %	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin-Uptake %	Polyn.-Content %	Carbon Yield %	Sec. Carb. Cont. %	Permeability, $cm^2 sec^{-1}$ (Press. Dec.)	(Vac. Dec)	Remarks
0058	5142.3	5.7×10^{-2}	-	136	175	8.55	7.59	50.5	4.32	8.2×10^{-5}	-	0.5	0.37	41.3	0.206	2.3×10^{-6}	3.1×10^{-7}	-
0059	5158.3	burst at 2.1 ata		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0060	5165.5	5.0×10^{-2}	-	136	175	7.77	6.56	51.1	3.94	1.3×10^{-4}	-	0.29	0.19	38.9	0.116	2.1×10^{-6}	7.3×10^{-7}	-
0061	5125.6	crack	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
0062	5190.0	5.4×10^{-2}	-	156	190	7.84	7.01	49.8	3.91	8.9×10^{-5}	-	0.40	0.26	38.1	0.152	3.1×10^{-6}	4.9×10^{-7}	-
0063	5155.1	4.7×10^{-2}	-	156	190	8.25	7.38	-	-	-	-	-	-	-	-	-	-	-
0064	5068.8	10.9×10^{-2}	-	210	107	9.50	8.27	50.9	4.84	1.7×10^{-4}	-	0.41	-	-	-	1.3×10^{-4}	-	-
0065	5068.9	10.9×10^{-2}	-	210	107	9.74	8.68	50.6	4.93	2.8×10^{-4}	-	1.05	0.84	40.8	0.428	5.1×10^{-6}	8.7×10^{-7}	-
0066	5065.3	9.6×10^{-2}	-	189	225	9.19	8.14	50.6	4.65	2.8×10^{-4}	-	2.98	2.80	-	-	-	-	3
0067	5232.6	2.9×10^{-2}	-	156	190	7.21	5.82	49.8	3.59	1.7×10^{-4}	-	0.39	0.26	-	-	-	-	2
0068	5050.9	7.0×10^{-2}	-	156	190	9.25	8.21	49.9	4.62	2.4×10^{-4}	-	0.49	0.37	-	-	-	-	2
0069	4981.9	19.5×10^{-2}	-	210	107	12.02	10.66	50.7	6.10	1.9×10^{-4}	-	3.92	3.75	-	-	-	-	3
0070	5124.6	7.1×10^{-2}	-	156	190	7.73	6.74	48.9	3.78	3.7×10^{-4}	1	0.86	0.67	43.3	0.372	burst at 4.0 ata		

1) small spalling, further impregnation treatment possible

2) high spalling, no further impregnation possible

3) broken during curing or baking

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Table 3.1.2

Fuel Rods (2nd Delivery)

No.	Original			First Impregnation								Second Impregnation						3rd Impr.	
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-pol. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Polym.-Content %	Carbon Yield %	Sec. Carb. Cont. %	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin-Uptake %	Carbon Yield %	Sec. Carb. Cont. %	Permeability, $cm^2 sec^{-1}$ (Press. Dec.)	(Vac. Dec.)	Remarks	Permeab. $cm^2\ sec^{-1}$ (Vac.Dec.)	Remarks
0071	5148	3.6×10^{-2}	-	528	178	8.04	7.51	51.5	4.14	3.7×10^{-5}	-	0.21	<0	0	3.2×10^{-6}	5.3×10^{-7}	-	3.1×10^{-7}	-
0072	5098	5.5×10^{-2}	-	288	120	7.99	-	51.7	4.16	4.6×10^{-5}	-	0.20	<0	0	5.3×10^{-6}	2.0×10^{-6}	-	9.4×10^{-7}	-
0073	5180	2.3×10^{-2}	-	264	89	7.65	-	50.0	3.83	1.0×10^{-5}	-	0.22	<0	0	3.4×10^{-6}	2.4×10^{-7}	-	-	-
0074	5148	3.1×10^{-2}	-	528	178	7.69	5.62	44.6	3.43	2.4×10^{-4}	-	0.80	62.5	0.49	1.5×10^{-5}	-	-	1.9×10^{-6}	-
0075	5118	5.1×10^{-2}	-	528	178	8.36	-	54.1	4.52	2.3×10^{-4}	-	0.32	<0	0	2.0×10^{-5}	-	-	6.3×10^{-6}	-
0076	5097	5.0×10^{-2}	-	264	130	8.85	6.94	51.0	4.51	1.7×10^{-4}	-	0.31	7.23	0.02	8.4×10^{-6}	4.9×10^{-6}	-	8.6×10^{-7}	-
0077	5120	5.0×10^{-2}	-	144	100	9.01	-	52.2	4.70	1.9×10^{-4}	1	0.37	<0	0	4.0×10^{-6}	8.2×10^{-7}	-	6.6×10^{-7}	-
0078	5126	4.2×10^{-2}	-	264	130	8.66	6.99	51.3	4.44	1.1×10^{-4}	-	0.21	<0	0	1.4×10^{-5}	-	-	1.2×10^{-5}	-
0081	5090	6.6×10^{-2}	-	144	100	9.22	7.85	51.2	4.72	1.4×10^{-4}	-	0.36	<0	0	5.3×10^{-6}	2.9×10^{-6}	-	1.3×10^{-6}	-
0082	5092	5.4×10^{-2}	-	528	178	9.01	7.62	51.5	4.64	8.2×10^{-5}	-	0.26	0.73	-	4.4×10^{-6}	1.2×10^{-6}	1	1.0×10^{-6}	-
0083	5125	3.5×10^{-2}	-	288	120	5.34	-	51.7	2.76	1.5×10^{-5}	-	0.19	<0	0	2.2×10^{-6}	4.3×10^{-7}	-	-	-
0085	5090	5.3×10^{-2}	-	192	100	8.97	7.65	51.9	4.66	5.5×10^{-5}	-	0.22	0	0	4.6×10^{-6}	8.7×10^{-7}	-	-	-
0088	5091	6.0×10^{-2}	-	528	178	8.45	6.75	49.7	4.20	3.8×10^{-4}	-	0.39	26.3	0.10	9.8×10^{-6}	3.9×10^{-6}	-	8.6×10^{-6}	-
0089	5062	3.9×10^{-2}	-	528	178	9.75	8.41	55.3	5.40	7.0×10^{-5}	-	0.30	<0	0	4.0×10^{-6}	9.1×10^{-7}	-	3.6×10^{-7}	-
0090	5059	6.6×10^{-2}	-	264	130	9.66	7.85	50.8	4.91	1.0×10^{-4}	-	0.31	4.2	0.01	1.2×10^{-5}	-	-	1.7×10^{-6}	-
0092	5133	4.2×10^{-2}	-	528	178	8.36	7.04	52.0	4.35	8.3×10^{-5}	-	0.23	<0	0	5.1×10^{-6}	4.7×10^{-6}	-	1.6×10^{-6}	-
0093	5064	burst at 3.1 ata																	
0094	5092	4.7×10^{-2}	-	120	215	7.91	6.21	46.5	3.68	4.1×10^{-4}	-	0.47	28.3	0.12	1.5×10^{-5}	-	-	1.1×10^{-6}	-
0095	5135	3.8×10^{-2}	-	528	178	8.26	5.89	51.2	4.23	2.1×10^{-4}	-	0.36	<0	0	1.1×10^{-5}	-	-	1.5×10^{-5}	-
0096	5126	3.4×10^{-2}	-	528	178	8.16	6.67	51.2	4.18	1.4×10^{-4}	-	0.19	0	0	5.4×10^{-6}	2.7×10^{-6}	-	-	-
0097	5086	7.4×10^{-2}	-	288	120	9.39	-	52.8	4.96	-	-	0.29	<0	0	4.0×10^{-6}	6.4×10^{-7}	-	3.5×10^{-7}	-
0098	5108	3.5×10^{-2}	-	144	95	8.86	-	52.9	4.69	8.6×10^{-5}	-	0.25	0	0	6.7×10^{-6}	2.9×10^{-6}	-	-	-
0099	5110	4.9×10^{-2}	-	264	130	9.04	7.44	50.9	4.61	1.4×10^{-4}	-	0.49	21.3	0.10	7.5×10^{-6}	2.9×10^{-6}	-	3.7×10^{-7}	-
0100	5114	3.9×10^{-2}	-	528	178	8.85	7.26	50.6	4.48	9.4×10^{-5}	-	0.21	7.14	0.02	6.1×10^{-6}	3.7×10^{-6}	-	7.4×10^{-7}	-
0101	5128	3.9×10^{-2}	-	144	95	8.20	-	52.7	4.32	6.2×10^{-5}	-	0.18	<0	0	1.1×10^{-5}	-	-	7.8×10^{-7}	-
0102	5108	5.1×10^{-2}	-	528	178	8.68	6.94	50.7	4.42	3.0×10^{-4}	-	0.31	13.9	0.04	1.2×10^{-5}	-	-	8.6×10^{-6}	-
0103	5076	5.4×10^{-2}	-	144	95	9.31	7.68	51.2	4.77	9.2×10^{-5}	-	0.27	<0	0	6.0×10^{-6}	3.1×10^{-6}	-	3.3×10^{-7}	-
0104	5111	4.7×10^{-2}	-	264	130	8.68	7.00	51.0	4.43	5.3×10^{-5}	-	0.20	<0	0	3.0×10^{-5}	-	-	1.7×10^{-5}	-

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Table 3.1.2 (Continued)

Fuel Rods (2^{nd} Delivery)

No.	Original			First Impregnation								Second Impregnation						3^{rd} Impr.	
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Polym.-Content %	Carbon Yield %	Sec. Carb. Cont. %	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin-Uptake %	Carbon Yield %	Sec. Carb. Cont. %	Permeability, $cm^2 sec^{-1}$ (Press.Dec.)	(Vac.Dec.)	Remarks	Permeab. $cm^2 sec^{-1}$ (Vac.Dec.)	Remarks
0105	5124	4.0×10^{-2}	-	264	130	8.27	7.35	56.5	4.68	8.8×10^{-5}	-	0.26	3.62	0.01	1.1×10^{-5}	-	-	4.2×10^{-6}	-
0106	5099	4.2×10^{-2}	-	144	100	9.35	-	51.6	4.82	1.7×10^{-4}	-	0.30	<0	0	7.9×10^{-6}	2.1×10^{-6}	-	9.9×10^{-7}	-
0107	5153	3.5×10^{-2}	-	144	95	8.31	7.24	51.6	4.29	1.5×10^{-5}	-	0.21	<0	0	4.1×10^{-6}	5.1×10^{-7}	-	4.5×10^{-7}	-
0108	5100	4.9×10^{-2}	-	264	130	8.92	7.15	51.2	4.57	1.1×10^{-4}	-	0.23	<0	0	2.2×10^{-5}	-	-	1.7×10^{-5}	-
0109	5074	7.0×10^{-2}	-	528	178	9.24	7.34	51.1	4.72	2.8×10^{-4}	-	0.37	0.5	0.0	6.4×10^{-5}	-	-	1.8×10^{-5}	-
0110	5120	4.5×10^{-2}	-	288	120	8.73	-	52.2	4.56	-	-	0.23	<0	0	1.0×10^{-5}	-	-	1.3×10^{-6}	-
0111	5068	6.4×10^{-2}	-	144	95	9.24	7.61	51.0	4.71	1.3×10^{-4}	-	0.28	<0	0	1.1×10^{-5}	-	1	7.1×10^{-6}	-
0112	5067	6.7×10^{-2}	-	120	215	8.97	7.83	47.1	5.25	2.4×10^{-4}	-	0.48	28.3	0.13	1.0×10^{-5}	-	-	1.9×10^{-6}	-
0113	5097	burst at 4.7 ata																	
0114	5100	3.9×10^{-2}	-	144	95	8.52	7.14	51.5	4.39	7.5×10^{-5}	-	0.29	<0	0	4.4×10^{-6}	1.6×10^{-6}	-	6.9×10^{-7}	-
0115	5117	4.4×10^{-2}	-	144	95	8.47	7.07	51.7	4.38	3.4×10^{-5}	-	0.17	0	0	7.1×10^{-6}	3.9×10^{-6}	-	-	-
0116	5069	4.6×10^{-2}	-	144	95	9.66	7.97	51.2	4.95	6.2×10^{-5}	-	0.30	<0	0	9.3×10^{-6}	5.5×10^{-6}	-	3.6×10^{-7}	-

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Table 3.1.3

Fuel Rods (3rd Delivery)

No.	Original			First Impregnation								Second Impregnation						3rd Impr.	
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Polym. Content %	Carbon Yield %	Sec. Carb. Cont. %	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin-Uptake %	Carbon Yield %	Sec. Carb. Cont. %	Permeability, $cm^2\ sec^{-1}$ (Press.Dec.)	(Vac. Dec.)	Remarks	Permeab. $cm^2 sec^{-1}$ (Vac.Dec.)	Remarks
0281	5077	burst at 3.1 ata																	
0282	5092	5.6×10^{-2}	-	192	140	8.64	-	51.2	-	-	-	0.17	<0	0	1.2×10^{-5}	-	-	4.8×10^{-6}	-
0283	5086	6.0×10^{-2}	-	192	140	9.00	-	52.5	-	-	-	0.27	0	0	2.6×10^{-6}	4.9×10^{-7}	-	-	-
0284	5040	burst at 2.1 ata																	
0285	5035	6.7×10^{-2}	-	192	140	9.71	-	51.9	-	-	-	1.36	2.09	0.05	9.5×10^{-6}	1.4×10^{-6}	-	-	-
0286	5081	5.6×10^{-2}	-	192	140	9.05	-	51.4	-	-	-	0.26	<0	0	1.4×10^{-6}	3.9×10^{-7}	-	-	-
0287	5067	5.2×10^{-2}	-	192	140	9.26	-	50.2	-	-	-	0.18	<0	0	4.5×10^{-7}	3.4×10^{-7}	-	-	-
0288	5106	6.5×10^{-2}	-	192	140	8.76	-	51.6	-	-	-	0.42	9.42	0.04	1.3×10^{-6}	7.8×10^{-7}	-	2.3×10^{-6}	-
0289	5134	4.5×10^{-2}	-	192	140	9.00	-	52.0	-	-	-	crack during impregnation					3	-	-
0290	5037	6.1×10^{-2}	-	192	140	9.71	-	52.2	-	-	-	0.47	19.7	0.09	1.9×10^{-6}	5.7×10^{-7}	-	1.9×10^{-6}	-
0291	5074	4.4×10^{-2}	-	192	140	8.82	-	51.8	-	4.1×10^{-5}	-	0.17	<0	0	2.2×10^{-6}	1.6×10^{-6}	-	2.6×10^{-6}	-
0292	5034	6.9×10^{-2}	-	192	140	9.95	-	53.6	-	-	-	0.73	29.0	0.22	6.4×10^{-6}	6.0×10^{-7}	-	4.3×10^{-6}	-
0293	5079	5.9×10^{-2}	-	192	140	9.83	-	53.3	-	-	-	0.42	<0	0	1.3×10^{-5}	-	-	3.2×10^{-6}	-
0294	5064	5.3×10^{-2}	-	192	140	9.27	-	51.3	-	-	-	0.38	11.3	0.04	6.4×10^{-7}	3.5×10^{-7}	-	-	-
0295	5020	8.2×10^{-2}	-	192	140	9.44	-	51.7	-	-	-	0.89	29.3	0.29	5.2×10^{-7}	5.1×10^{-7}	-	2.4×10^{-7}	-
0296	5070	5.3×10^{-2}	-	192	140	9.91	-	55.6	-	-	-	0.32	<0	0	4.3×10^{-6}	1.7×10^{-6}	-	5.2×10^{-6}	-
0297	5035	4.4×10^{-2}	-	192	140	10.42	-	58.3	-	-	-	0.33	25.0	0.08	2.5×10^{-6}	1.2×10^{-6}	-	1.7×10^{-6}	-
0298	5109	burst at 7.4 ata																	
0299	5090	4.3×10^{-2}	-	192	70	9.72	-	50.3	-	3.6×10^{-5}	-	0.27	14.7	0.04	6.9×10^{-6}	3.5×10^{-6}	-	1.3×10^{-5}	-
0300	5145	2.9×10^{-2}	-	192	140	8.31	-	50.9	-	-	-	crack during impregnation					3	-	-
0301	5125	3.8×10^{-2}	-	192	70	8.39	-	50.2	-	-	-	0.16	8.33	0.01	1.7×10^{-5}	-	-	5.3×10^{-7}	-
0302	5131	2.9×10^{-2}	-	192	70	8.62	-	49.5	-	-	-	0.18	23.2	0.04	6.0×10^{-6}	4.0×10^{-6}	-	1.4×10^{-5}	-
0303	5078	4.8×10^{-2}	-	192	70	8.91	-	50.6	-	-	-	0.32	16.9	0.04	9.9×10^{-6}	4.2×10^{-6}	-	6.3×10^{-6}	-
0304	5110	4.6×10^{-2}	-	192	70	8.73	-	50.5	-	4.5×10^{-5}	-	0.27	4.2	0.01	8.8×10^{-6}	5.7×10^{-6}	-	8.6×10^{-6}	-
0305	5052	5.9×10^{-2}	-	192	70	9.36	-	50.1	-	-	-	0.35	30.3	0.11	1.3×10^{-5}	-	-	8.0×10^{-7}	-

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Table 3.1.4

Fuel Rods (4^{th} Delivery)

No.	Original			First Impregnation								Second Impregnation						3rd Impr.	
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Polym. Content %	Carbon Yield %	Sec. Carb. Cont. %	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin-Uptake %	Carbon Yield %	Sec. Carb. Cont. %	Permeability, $cm^2 sec^{-1}$ (Press.Dec.)	(Vac.Dec.)	Remarks	Permeab. $cm^2 sec^{-1}$ (Vac.Dec.)	Remarks
0117	5107	4.3×10^{-2}	-	288	100	8.11	-	51.6	4.18	-	-	0.27	27.8	-	2.9×10^{-6}	2.7×10^{-6}	-	3.5×10^{-6}	-
0118	5162	2.9×10^{-2}	-	288	100	6.65	-	50.3	3.34	-	-	0.30	43.5	-	2.4×10^{-6}	8.9×10^{-7}	-	8.5×10^{-7}	-
0119	5124	3.3×10^{-2}	-	288	100	7.43	-	51.0	3.79	1.1×10^{-4}	-	0.22	21.6	-	1.9×10^{-6}	1.0×10^{-6}	-	1.1×10^{-6}	-
0120	5123	crack on receipt																	
0121	5131	crack on receipt																	
0122	5101	4.9×10^{-2}	-	288	100	8.01	-	51.2	4.10	2.8×10^{-4}	-	0.53	30.8	-	$< 10^{-6}$	1.1×10^{-6}	-	3.9×10^{-6}	-
0123	5096	crack on receipt																	
0124	5023	crack on receipt																	
0125	5106	4.9×10^{-2}	-	168	85	9.30	-	51.5	4.79	-	-	0.33	30.3	-	1.5×10^{-5}	-	-	1.6×10^{-6}	-
0126	5020	9.7×10^{-2}	-	168	85	9.34	-	51.4	4.80	-	-	0.53	38.6	-	4.8×10^{-5}	-	-	1.3×10^{-5}	-
0127	5075	5.1×10^{-2}	-	168	85	8.92	-	52.0	4.64	-	-	0.18	16.8	0.02	6.7×10^{-6}	2.7×10^{-6}	-	-	3
0128	5116	5.1×10^{-2}	-	168	85	9.03	-	51.0	4.61	-	-	0.18	14.2	0.03	1.4×10^{-5}	-	-	1.5×10^{-6}	-
0129	5134	3.9×10^{-2}	-	168	85	8.28	-	51.6	4.24	-	-	0.29	33.7	0.09	9.5×10^{-7}	9.1×10^{-7}	-	1.2×10^{-6}	-
0130	5146	crack on receipt																	
0131	5088	5.1×10^{-2}	-	288	100	9.09	-	46.4	4.22	-	-	0.39	26.8	0.10	3.5×10^{-6}	2.5×10^{-6}	-	4.8×10^{-6}	-
0132	5094	5.2×10^{-2}	-	288	100	9.17	-	51.6	4.73	-	-	0.31	0	0	$< 10^{-6}$	7.7×10^{-7}	-	5.7×10^{-6}	-
0133	5123	4.0×10^{-2}	-	288	100	8.44	-	51.1	4.31	-	-	0.15	1.26	0.0	2.5×10^{-6}	9.9×10^{-7}	-	5.5×10^{-6}	-
0134	5070	5.6×10^{-2}	-	168	85	8.89	-	51.7	4.60	-	-	0.24	30.2	0.08	1.9×10^{-6}	1.0×10^{-6}	-	1.9×10^{-6}	-
0135	5114	6.8×10^{-2}	-	288	100	8.60	-	51.4	4.44	-	-	0.73	33.7	0.24	2.1×10^{-6}	4.0×10^{-7}	-	-	-
0136	5001	8.2×10^{-2}	-	168	85	9.21	-	51.3	4.73	-	-	0.29	25.5	0.08	3.4×10^{-5}	-	-	1.3×10^{-6}	-
0137	5102	4.5×10^{-2}	-	168	85	8.62	-	49.8	4.29	-	-	0.23	broken during impregnation						
0138	5117	4.5×10^{-2}	-	168	85	8.24	-	52.6	4.33	-	-	0.35	29.6	0.11	1.4×10^{-6}	5.0×10^{-7}	-	1.2×10^{-6}	-
0139	5087	5.7×10^{-2}	-	168	85	9.25	-	51.8	4.79	-	-	0.42	36.0	0.15	1.9×10^{-5}	-	-	2.0×10^{-6}	-
0140	5122	3.4×10^{-2}	-	168	85	8.20	-	52.0	4.26	-	-	0.22	31.7	0.07	1.0×10^{-5}	-	-	1.2×10^{-6}	-
0141	5058	burst at 7.0 ata																	
0142	5082	5.1×10^{-2}	-	192	90	8.81	-	51.0	4.49	-	-	0.15	5.0	0.01	$< 10^{-6}$	2.1×10^{-7}	-	-	-
0143	5113	burst at 2.6 ata																	

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Table 3.1.4 (Continued)

Fuel Rods (4^{th} Delivery)

No.	Original			First Impregnation								Second Impregnation						3rd Impr.	
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Polym. Content %	Carbon Yield %	Sec. Carb. Cont. %	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin-Uptake %	Carbon Yield %	Sec. Carb. Cont. %	Permeability, $cm^2\ sec^{-1}$ (Press.Dec.)	(Vac.Dec.)	Remarks	Permeab. $cm^2 sec^{-1}$ (Vac.Dec.)	Remarks
0144	5092	7.4×10^{-2}	-	192	90	9.12	-	50.8	4.63	1.5×10^{-4}	-	0.42	25.9	0.11	$< 10^{-6}$	1.6×10^{-7}	-	-	-
0145	5027	8.3×10^{-2}	-	192	90	8.61	-	50.7	4.37	-	-	0.97	39.3	0.39	2.9×10^{-6}	2.2×10^{-6}	-	4.8×10^{-6}	-
0146	5034	7.5×10^{-2}	-	192	90	9.21	-	51.1	4.71	-	-	0.68	36.4	0.24	1.4×10^{-6}	3.9×10^{-7}	-	-	-
0147	5030	8.5×10^{-2}	-	192	90	8.77	-	50.4	4.42	-	-	0.73	38.9	0.29	2.6×10^{-5}	-	-	4.3×10^{-6}	-
0148	5101	3.9×10^{-2}	-	168	85	8.15	-	51.3	4.18	-	-	0.33	25.9	0.08	2.4×10^{-6}	2.0×10^{-6}	-	1.5×10^{-6}	-
0149	5065	crack on receipt																	
0150	5121	3.1×10^{-2}	-	168	85	7.60	-	50.4	3.83	-	-	0.57	34.3	0.19	1.1×10^{-5}	-	-	9.0×10^{-7}	-
0151	5108	crack on receipt																	
0152	5128	3.7×10^{-2}	-	216	156	8.94	-	50.5	4.52	-	-	0.22	13.8	0.03	1.2×10^{-5}	-	-	9.1×10^{-7}	-
0153	5088	5.1×10^{-2}	-	216	156	9.50	-	50.4	4.79	-	-	0.41	22.4	0.10	8.6×10^{-6}	4.6×10^{-6}	-	7.8×10^{-7}	-
0154	5156	2.4×10^{-2}	-	216	156	8.54	-	50.1	4.28	-	-	0.15	2.50	0.01	5.4×10^{-6}	3.9×10^{-6}	-	1.4×10^{-6}	-
0155	5037	crack on receipt																	
0156	5080	5.5×10^{-2}	-	216	156	9.52	-	49.1	4.68	-	-	0.18	9.18	0.02	2.0×10^{-5}	-	-	2.4×10^{-6}	-
0157	5074	7.9×10^{-2}	-	168	85	9.69	-	51.4	4.98	-	-	0.29	32.9	0.09	6.0×10^{-6}	3.3×10^{-6}	-	2.5×10^{-6}	-
0158	5132	4.5×10^{-2}	-	168	85	8.33	-	51.8	4.32	-	-	0.18	20.6	0.04	2.1×10^{-6}	1.5×10^{-6}	-	6.3×10^{-6}	-
0159	5093	3.9×10^{-2}	-	192	90	8.81	-	51.1	4.50	-	-	0.23	0	0	1.4×10^{-6}	1.1×10^{-7}	-	-	-
0160	5102	6.3×10^{-2}	-	192	90	9.03	-	50.3	4.54	-	1	0.20	11.9	0.02	2.1×10^{-6}	1.5×10^{-7}	-	-	-
0161	5084	5.3×10^{-2}	-	168	85	9.38	-	52.2	4.90	1.0×10^{-4}	-	0.20	19.0	0.04	$< 10^{-6}$	7.2×10^{-7}	-	crack during impregnation	

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Table 3.1.5

Fuel Rods (5^{th} Delivery)

No.	Original			First Impregnation							Second Impregnation						3^{rd} Impr.	
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeability, $cm^2\ sec^{-1}$ (Press.Dec.)	(Vac. Dec.)	Remarks	Permeab. $cm^2\ sec^{-1}$ (Vac. Dec.)	Remarks
0162	5086.1	4.4×10^{-2}	-	176	162	8.87	51.7	4.59	9.2×10^{-5}	-	0.25	19.8	0.05	2.8×10^{-6}	1.2×10^{-6}	-	1.9×10^{-6}	-
0163	5070.2	burst at 3.4 ata																
0164	5159.8	2.7×10^{-2}	-	413	109	9.25	49.9	4.12	-	-	0.33	35.2	0.12	9.5×10^{-7}	7.0×10^{-7}	-	1.7×10^{-6}	-
0165	5061.3	7.6×10^{-2}	-	413	108	9.27	49.8	4.62	-	-	0.90	38.4	0.35	1.4×10^{-6}	1.2×10^{-6}	-	2.6×10^{-6}	2
0166	5074.2	crack on receipt																
0167	5114.0	4.8×10^{-2}	-	192	152.4	8.68	51.0	4.43	-	-	0.32	5.6	0.02	3.0×10^{-5}	-	-	1.3×10^{-5}	-
0168	5068.6	7.9×10^{-2}	-	165	80	9.36	52.7	4.93	-	-	0.60	26.1	0.16	9.5×10^{-7}	3.2×10^{-7}	-	-	-
0169	5144.1	3.0×10^{-2}	-	192	152.4	8.39	50.7	4.25	-	-	0.45	9.3	0.03	1.1×10^{-5}	-	-	3.6×10^{-6}	-
0170	5099.0	5.4×10^{-2}	-	192	152.4	8.33	50.3	4.19	-	-	0.59	27.5	0.16	3.0×10^{-5}	-	-	1.1×10^{-5}	-
0171	5005.0	1.1×10^{-2}	-	358	130	9.70	51.0	4.95	-	-	2.17	43.2	0.94	2.9×10^{-6}	2.8×10^{-6}	-	1.3×10^{-6}	-
0172	5025.6	9.4×10^{-2}	-	176	162	9.75	51.1	4.98	4.7×10^{-4}	-	1.01	-	-	1.9×10^{-6}	1.9×10^{-7}	-	-	-
0173	5072.9	4.7×10^{-2}	-	192	152.4	8.52	50.5	4.30	-	-	0.29	22.6	0.07	2.8×10^{-6}	1.7×10^{-7}	-	-	-
0174	5110.6	4.4×10^{-2}	-	153	150	9.13	47.3	4.73	1.5×10^{-4}	-	0.39	23.0	0.09	1.9×10^{-6}	2.2×10^{-6}	-	1.7×10^{-6}	-
0175	5142.8	3.1×10^{-2}	-	165	80	8.36	51.8	4.33	1.4×10^{-4}	-	0.21	10.5	0.02	$< 10^{-6}$	4.6×10^{-7}	-	-	-
0176	5079.3	5.1×10^{-2}	-	153	150	9.02	51.3	4.63	1.6×10^{-4}	-	0.43	19.9	0.09	9.5×10^{-7}	8.3×10^{-7}	-	1.3×10^{-6}	-
0177	5005.7	6.5×10^{-2}	-	165	80	9.78	51.7	5.06	-	-	0.47	24.9	0.12	$< 10^{-6}$	1.3×10^{-7}	-	-	-
0178	5034.5	7.0×10^{-2}	-	180	128	9.94	51.8	5.04	-	-	0.50	19.7	0.10	7.6×10^{-6}	4.2×10^{-6}	-	9.3×10^{-6}	-
0179	5033.8	6.5×10^{-2}	-	192	152.4	9.37	50.6	4.73	-	-	0.31	23.0	0.07	$< 10^{-6}$	2.4×10^{-7}	-	-	-
0180	5066.6	4.4×10^{-2}	-	176	162	8.61	51.4	4.42	5.1×10^{-5}	-	0.31	21.8	0.07	$< 10^{-6}$	4.3×10^{-7}	-	-	-
0181	5085.5	5.2×10^{-2}	-	192	152.4	9.24	51.3	4.74	-	-	0.38	7.9	0.03	1.1×10^{-5}	-	-	5.2×10^{-6}	-
0182	5118.3	3.2×10^{-2}	-	192	152.4	8.06	51.5	4.15	-	-	0.46	30.5	0.14	4.7×10^{-6}	2.6×10^{-6}	-	2.4×10^{-6}	-
0183	5029.6	burst at 7.2 ata																
0184	5106.5	5.1×10^{-2}	-	165	80	9.43	50.7	4.78	-	-	0.24	14.5	0.04	7.7×10^{-7}	2.6×10^{-7}	-	-	-
0185	5110.1	5.3×10^{-2}	-	165	80	8.59	51.9	4.46	8.8×10^{-5}	-	0.22	-	-	9.5×10^{-7}	2.3×10^{-6}	-	4.8×10^{-6}	-
0186	5095.9	4.0×10^{-2}	-	192	152.4	8.65	51.0	4.41	9.8×10^{-5}	-	0.26	24.1	0.06	$< 10^{-6}$	4.9×10^{-7}	-	-	-
0187	5068.0	5.0×10^{-2}	-	180	128	8.81	51.9	4.57	-	-	0.37	14.1	0.05	1.1×10^{-5}	-	-	7.3×10^{-6}	-
0188	5108.7	4.0×10^{-2}	-	180	128	8.33	52.6	4.38	1.6×10^{-4}	-	0.20	1.89	0.004	6.0×10^{-6}	3.9×10^{-6}	-	3.2×10^{-6}	-
0189	5094.5	7.0×10^{-2}	-	154	185	9.12	51.2	4.67	-	-	0.42	31.8	0.13	$< 10^{-6}$	1.8×10^{-7}	-	-	-

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Table 3.1.5 (Continued)

Fuel Rods (5th Delivery)

No.	Original			First Impregnation							Second Impregnation						3rd Impr.	
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeability, $cm^2\ sec^{-1}$ (Press. Dec.)	(Vac. Dec.)	Remarks	Permeab. $cm^2\ sec^{-1}$ (Vac.Dec.)	Remarks
0190	5072.1	5.2×10^{-2}	-	130	124	9.65	51.5	4.97	1.2×10^{-4}	-	0.21	13.4	0.03	7.7×10^{-7}	5.3×10^{-7}	-	1.3×10^{-6}	-
0191	5099.6	4.7×10^{-2}	-	154	185	8.38	52.5	4.40	-	-	0.54	37.5	0.20	2.9×10^{-6}	7.5×10^{-7}	-	1.7×10^{-6}	-
0192	5080.5	5.5×10^{-2}	-	136	117	9.33	50.9	4.75	-	-	0.50	31.2	0.15	1.9×10^{-6}	4.9×10^{-7}	-	-	-
0193	5163.0	3.4×10^{-2}	-	158	185	8.12	50.8	4.12	-	-	0.17	18.0	0.03	10^{-6}	3.9×10^{-7}	-	-	-
0194	5095.0	4.8×10^{-2}	-	136	117	8.59	52.6	4.52	-	-	0.74	27.3	0.20	7.5×10^{-6}	5.0×10^{-6}	-	3.4×10^{-6}	-
0195	5132.2	2.9×10^{-2}	-	136	117	8.70	52.2	4.54	-	-	0.05	-	-	10^{-6}	1.2×10^{-7}	-	-	-
0196	5128.1	3.0×10^{-2}	-	358	130	8.24	51.4	4.24	-	-	0.22	11.0	0.02	9.5×10^{-7}	1.1×10^{-6}	-	2.9×10^{-6}	-
0197	4991.0	1.2×10^{-2}	-	136	117	9.95	51.4	5.11	-	-	0.92	39.4	0.36	4.8×10^{-6}	2.2×10^{-6}	-	3.2×10^{-6}	-
0198	5069.4	5.9×10^{-2}	-	136	117	9.21	51.2	4.72	-	-	0.67	38.9	0.26	2.8×10^{-6}	4.1×10^{-7}	-	-	-
0199	5064.6	5.7×10^{-2}	-	136	117	9.25	51.4	4.75	-	-	0.28	8.1	0.02	4.8×10^{-6}	3.4×10^{-6}	-	2.8×10^{-6}	-
0200	5039.2	3.5×10^{-2}	-	174	151	8.72	50.9	4.44	-	-	0.43	33.6	0.14	1.9×10^{-6}	9.3×10^{-7}	-	5.7×10^{-6}	-
0201	5108.0	5.0×10^{-2}	-	136	117	9.06	50.6	4.57	-	-	0.29	6.4	0.02	8.8×10^{-6}	7.1×10^{-6}	-	4.5×10^{-6}	-
0202	5035.4	8.3×10^{-2}	-	136	117	9.54	51.5	4.91	-	-	0.75	35.0	0.26	-	-	3	-	-
0203	5048.4	6.6×10^{-2}	-	165	80	9.64	50.6	4.88	-	-	1.09	40.7	0.44	9.5×10^{-7}	1.0×10^{-7}	-	-	-
0204	4989.1	1.3×10^{-1}	-	180	128	0.49	53.0	5.56	-	-	0.65	19.0	0.12	1.1×10^{-5}	-	-	4.0×10^{-6}	-
0205	5079.3	5.2×10^{-2}	-	165	80	9.01	51.6	4.65	-	-	0.47	25.5	0.12	10^{-6}	2.3×10^{-7}	-	-	-
0206	4989.2	1.0×10^{-1}	-	136	117	10.34	51.4	5.31	-	-	1.34	39.4	0.53	2.8×10^{-6}	6.7×10^{-7}	-	1.6×10^{-7}	-
0207	5003.0	1.0×10^{-1}	-	187	93	9.33	52.1	4.86	4.4×10^{-4}	-	1.12	41.0	0.46	9.5×10^{-7}	5.8×10^{-7}	-	2.4×10^{-6}	-
0208	5090.0	6.3×10^{-2}	-	358	130	9.35	50.8	4.67	-	-	0.46	10.6	0.05	4.8×10^{-6}	5.5×10^{-6}	-	1.3×10^{-5}	-
0209	5067.3	6.2×10^{-2}	-	187	93	9.07	52.0	4.72	-	-	0.14	-	-	9.0×10^{-6}	8.0×10^{-6}	-	3.9×10^{-6}	-
0210	5131.6	3.6×10^{-2}	-	187	93	8.10	53.0	4.29	-	-	0.21	4.48	0.09	1.1×10^{-5}	-	-	5.0×10^{-6}	-
0211	5105.5	5.6×10^{-2}	-	187	93	8.80	53.2	4.68	-	-	0.46	14.61	0.07	2.0×10^{-5}	-	-	1.1×10^{-5}	-
0212	5069.8	6.2×10^{-2}	-	187	93	8.31	52.9	4.39	-	-	0.28	19.0	0.05	6.7×10^{-6}	4.5×10^{-6}	-	3.9×10^{-6}	-
0213	5053.6	6.7×10^{-2}	-	358	130	8.65	51.3	4.44	-	-	1.32	39.0	0.63	1.8×10^{-5}	-	-	-	-
0214	5045.6	6.2×10^{-2}	-	187	93	9.53	51.7	4.93	1.0×10^{-4}	-	0.25	21.2	0.05	2.9×10^{-6}	8.2×10^{-7}	-	1.2×10^{-6}	-
0215	5070.1	7.7×10^{-2}	-	180	128	8.48	52.7	4.47	-	-	0.33	15.5	0.05	9.7×10^{-6}	7.1×10^{-6}	-	3.2×10^{-6}	-
0216	5039.4	7.6×10^{-2}	-	187	93	9.25	51.6	4.77	-	-	0.59	31.7	0.19	4.8×10^{-6}	3.3×10^{-6}	-	2.5×10^{-6}	-
0217	5140.1	3.1×10^{-2}	-	165	90	8.10	51.7	4.19	-	-	0.36	17.8	0.06	9.5×10^{-7}	1.6×10^{-7}	-	-	-

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Table 3.1.5 (Continued)

Fuel Rods (5th Delivery)

No.	Original			First Impregnation							Second Impregnation						3rd Impr.	
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeability, $cm^2\ sec^{-1}$ (Press. Dec.)	(Vac. Dec.)	Remarks	Permeab. $cm^2\ sec^{-1}$ (Vac.Dec.)	Remarks
0218	5037.8	7.1×10^{-2}	-	180	128	9.31	52.7	4.91	-	-	0.41	20.7	0.09	6.3×10^{-6}	6.0×10^{-6}	-	4.0×10^{-6}	-
0219	5103.1	5.0×10^{-2}	-	174	161	8.29	50.8	4.21	-	-	0.38	8.8	0.03	1.4×10^{-5}	-	-	3.8×10^{-6}	-
0220	5132.3	3.6×10^{-2}	-	180	128	7.82	51.9	4.06	-	-	0.65	32.7	0.21	9.5×10^{-7}	1.9×10^{-6}	-	5.1×10^{-6}	-
0221	5005.3	9.7×10^{-2}	-	158	185	10.05	49.4	4.95	-	-	0.39	28.6	0.11	1.9×10^{-6}	1.3×10^{-7}	-	-	-
0222	5137.2	crack on receipt																
0223	5115.1	4.4×10^{-2}	-	136	117	8.68	51.4	4.46	-	-	0.25	14.8	0.04	1.9×10^{-6}	7.7×10^{-7}	-	3.8×10^{-6}	-
0224	5078.2	5.2×10^{-2}	-	158	185	8.71	51.7	4.50	-	-	0.59	35.7	0.21	2.9×10^{-6}	5.2×10^{-6}	-	2.5×10^{-5}	-
0225	5095.0	5.3×10^{-2}	-	187	93	8.43	53.3	4.49	8.5×10^{-5}	-	0.22	6.9	0.02	7.6×10^{-6}	4.2×10^{-6}	-	3.7×10^{-6}	-
0226	5162.4	2.5×10^{-2}	-	136	117	8.23	51.0	4.20	-	-	0.14	-	-	4.8×10^{-6}	4.8×10^{-6}	-	1.9×10^{-6}	-
0227	5036.0	8.1×10^{-2}	-	158	185	9.39	52.4	4.92	-	-	0.60	31.6	0.19	2.9×10^{-6}	4.9×10^{-7}	-	-	-
0228	5058.9	6.2×10^{-2}	-	136	117	9.43	50.6	4.77	1.7×10^{-4}	3								
0229	5065.6	6.3×10^{-2}	-	165	80	8.96	51.7	4.63	-	-	0.96	34.6	0.33	8.1×10^{-7}	5.9×10^{-7}	-	7.1×10^{-7}	-
0230	5145.5	2.5×10^{-2}	-	130	124	7.31	51.7	3.78	-	-	0.11	-	-	1.9×10^{-6}	6.0×10^{-7}	-	1.2×10^{-6}	-
0231	5078.4	4.8×10^{-2}	-	314	130	8.56	50.4	4.31	-	-	0.69	17.0	0.12	6.8×10^{-4}	-	-	3.8×10^{-6}	-
0232	5014.5	burst at 2.8 ata																
0233	5020.5	8.5×10^{-2}	-	136	117	9.34	50.9	4.75	-	-	0.59	37.0	0.22	4.8×10^{-6}	3.4×10^{-6}	-	8.6×10^{-6}	-
0234	5045.3	8.8×10^{-2}	-	136	117	9.49	51.4	4.88	-	-	0.72	28.7	0.21	7.6×10^{-6}	4.6×10^{-8}	-	5.7×10^{-6}	-
0235	5038.1	1.1×10^{-1}	-	136	117	9.36	51.0	4.77	-	-	0.98	44.3	0.44	$< 10^{-6}$	6.8×10^{-8}	-	-	-
0236	5024.8	5.1×10^{-2}	-	314	130	10.05	55.5	5.58	-	-	0.61	14.6	0.09	1.0×10^{-3}	-	-	2.6×10^{-6}	-
0237	5100.8	4.6×10^{-2}	-	136	117	8.85	50.9	4.50	-	-	0.26	-	-	4.7×10^{-6}	1.0×10^{-6}	-	4.9×10^{-6}	-
0238	5088.6	5.8×10^{-2}	-	314	130	9.04	50.4	4.56	-	-	2.43	44.8	1.09	2.2×10^{-5}	-	-	crack during impr.	
0239	5052.4	5.8×10^{-2}	-	136	117	9.33	51.3	4.79	-	-	0.34	28.1	0.96	$< 10^{-6}$	4.2×10^{-7}	-	-	-
0240	5117.5	3.9×10^{-2}	-	158	185	7.64	51.9	3.97	4.2×10^{-4}	-	0.37	19.7	0.07	1.9×10^{-6}	3.0×10^{-6}	-	1.5×10^{-5}	-
0241	5114.9	crack on receipt																

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Table 3.1.6

Fuel Rods (6th Delivery)

No.	Original			First Impregnation							Second Impregnation						3rd Impr.	
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeab. (Press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeability, $cm^2\ sec^{-1}$ (Press. Dec.)	(Vac. Dec.)	Remarks	Permeab. $cm^2\ sec^{-1}$ (Vac.Dec.)	Remarks
0242	5071.2	5.3×10^{-2}	-	134	135	9.11	50.6	4.61	-	-	0.36	26.3	0.10	3.8×10^{-6}	2.5×10^{-6}	-	2.8×10^{-7}	-
0243	5106.1	burst at 2.4 ata																
0244	5053.6	5.7×10^{-2}	-	111	192	8.40	51.7	4.34	-	-	0.75	44.0	0.33	3.8×10^{-6}	4.8×10^{-7}	-	-	-
0245	5107.4	4.4×10^{-2}	-	303	117	8.33	51.7	4.31	5.0×10^{-5}	-	0.23	26.4	0.06	$< 10^{-6}$	2.5×10^{-7}	-	-	-
0247	5048.0	3.6×10^{-2}	-	303	117	8.43	51.3	4.32	-	-	0.97	2.0	0.02	2.8×10^{-6}	2.3×10^{-6}	-	3.5×10^{-7}	-
0248	5114.3	4.8×10^{-2}	-	317	115.3	8.45	51.8	4.38	-	-	0.17	14.0	0.02	4.7×10^{-6}	5.8×10^{-7}	-	-	-
0249	5054.5	8.0×10^{-2}	-	303	117	9.52	52.3	4.98	-	-	0.19	6.9	0.01	2.8×10^{-6}	3.3×10^{-6}	-	1.4×10^{-6}	-
0250	5008.4	7.3×10^{-2}	-	317	115.3	9.93	51.9	5.15	-	-	0.28	30.5	0.09	3.8×10^{-6}	6.0×10^{-7}	-	-	-
0251	5102.0	7.7×10^{-2}	-	317	115.3	9.45	51.4	4.86	-	-	0.50	37.6	0.19	1.9×10^{-6}	4.9×10^{-7}	-	-	-
0252	5144.8	3.2×10^{-2}	-	111	192	7.84	52.1	4.08	-	-	0.20	44.9	0.09	3.8×10^{-6}	1.5×10^{-6}	-	6.7×10^{-7}	-
0253	5043.2	9.8×10^{-2}	-	130	118.2	9.46	51.7	4.89	-	-	0.56	31.2	0.18	5.7×10^{-6}	1.6×10^{-6}	-	2.3×10^{-7}	-
0254	5040.5	7.0×10^{-2}	-	134	135	9.10	50.0	4.56	-	-	0.88	38.3	0.34	1.1×10^{-5}	-	-	7.8×10^{-7}	-
0255	5084.9	7.5×10^{-2}	-	111	192	8.64	51.0	4.41	-	-	0.67	35.0	0.24	3.0×10^{-4}	-	-	1.5×10^{-5}	-
0256	5113.7	4.0×10^{-2}	-	109	116	8.27	51.5	4.26	-	-	0.16	12.8	0.02	2.1×10^{-6}	1.5×10^{-6}	-	1.8×10^{-6}	-
0257	5091.3	crack on receipt																
0258	5112.8	4.1×10^{-2}	-	130	118.2	8.82	51.4	4.53	-	-	0.21	18.6	0.04	2.8×10^{-6}	1.5×10^{-6}	-	5.9×10^{-7}	-
0259	5084.1	crack on receipt																
0260	5121.0	2.5×10^{-2}	-	134	135	7.98	51.9	4.14	-	-	0.16	<0	-	1.1×10^{-5}	-	-	4.0×10^{-7}	-
0261	5044.5	7.4×10^{-2}	-	109	116	8.95	52.5	4.70	-	-	0.35	29.0	0.10	2.8×10^{-6}	4.4×10^{-7}	-	-	-
0262	5134.0	4.2×10^{-2}	-	303	117	8.61	51.5	4.44	9.3×10^{-5}	-	0.25	29.2	0.07	1.9×10^{-6}	4.8×10^{-7}	-	-	-
0263	5127.0	crack on receipt																
0264	5155.6	crack on receipt																
0265	5131.0	4.1×10^{-2}	-	303	117	8.65	51.6	4.47	-	-	0.31	13.4	0.04	3.8×10^{-6}	2.7×10^{-6}	-	1.9×10^{-6}	-
0266	5051.8	crack on receipt																
0267	5155.5	2.6×10^{-2}	-	134	135	7.26	50.2	3.65	-	0	<0	<0	-	1.3×10^{-5}	-	-	3.1×10^{-6}	-
0268	5186.9	crack on receipt																
0269	5253.0	2.0×10^{-2}		burst during impregnation														
0270	5163.0	2.7×10^{-2}	-	134	135	8.10	51.4	4.16	3.4×10^{-5}	-	<0	<0	-	7.2×10^{-6}	6.5×10^{-6}	-	1.1×10^{-6}	-

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Table 3.1.6 (Continued)

Fuel Rods (6th Delivery)

No.	Original			First Impregnation							Second Impregnation						3rd Impr.	
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeability, $cm^2\ sec^{-1}$ (Press.Dec.)	(Vac. Dec.)	Remarks	Permeab. $cm^2\ sec^{-1}$ (Vac.Dec.)	Remarks
0271	5247.9	burst at 5.6 ata																
0272	5047.5	crack on receipt																
0273	5222.0	crack on receipt																
0275	5264.0	burst at 2.3 ata																
0276	5061.2	crack on receipt																
0277	5043.6	5.8×10^{-2}	-	134	135	8.91	49.7	4.43	-	-	0.92	38.7	0.36	2.8×10^{-5}	spalled during 3. baking			
0278	5203.3	crack on receipt																
0306	5066.2	crack on receipt																
0307	5099.0	crack on receipt																
0308	5097.8	8.7×10^{-2}	-	burst during impregnation														
0309	5131.8	5.1×10^{-2}	-	111	192	7.91	52.8	4.17	-	-	0.25	48.5	0.12	9.2×10^{-6}	3.8×10^{-6}	-	7.5×10^{-6}	-
0311	5164.4	4.3×10^{-2}	-	339	170	6.53	62.8	4.11	-	-	0.92	38.7	0.36	6.6×10^{-6}	3.0×10^{-7}	-	1.2×10^{-6}	-
0312	5122.6	5.2×10^{-2}	-	317	115.3	9.02	51.6	4.66	-	-	0.38	40.4	0.15	2.8×10^{-6}	6.3×10^{-7}	-	-	-
0313	5114.5	4.2×10^{-2}	-	109	116	8.22	55.2	4.55	-	-	0.39	23.0	0.09	1.0×10^{-3}	-	-	6.0×10^{-4}	-
0314	5070.1	9.5×10^{-2}	-	303	117	9.14	51.5	4.71	-	-	0.70	37.5	0.26	9.5×10^{-7}	1.1×10^{-7}	-	-	-
0316	5052.0	6.3×10^{-2}	-	111	192	8.40	74.9	6.29	-	-	0.39	<0	-	1.0×10^{-5}	-	-	1.6×10^{-7}	-
0317	5108.7	4.2×10^{-2}	-	339	170	7.98	51.2	4.09	-	-	0.34	33.0	0.11	3.8×10^{-6}	6.2×10^{-7}	-	-	-
0318	5097.2	7.2×10^{-2}	-	burst during impregnation														
0319	5130.4	5.3×10^{-2}	-	317	115.3	9.04	51.6	4.66	-	-	0.31	29.9	0.09	1.9×10^{-6}	1.9×10^{-7}	-	-	-
0320	5139.3	6.4×10^{-2}	-	317	115.3	9.18	51.3	4.71	-	-	0.40	37.5	0.15	2.8×10^{-6}	1.5×10^{-7}	-	-	-
0321	5132.5	burst at 2.7 ata																
0322	5159.4	crack on receipt																
0323	5201.2	2.0×10^{-2}	-	109	116	7.29	53.8	3.92	-	-	1.03	<0	-	3.8×10^{-6}	2.9×10^{-6}	-	-	-
0324	5115.6	burst at 2.2 ata																
0325	5124.2	6.2×10^{-2}	-	303	117	9.19	51.7	4.74	-	-	0.15	1.2	0.02	1.9×10^{-5}	-	-	3.1×10^{-6}	-
0326	5138.0	6.3×10^{-2}	-	109	160	8.52	51.6	4.41	-	-	0.52	39.3	0.21	2.8×10^{-6}	3.3×10^{-7}	-	-	-
0327	5048.6	1.2×10^{-1}	-	109	116	9.07	51.1	(4.63 badly chipped by handling)										
0328	5094.4	6.5×10^{-2}	-	338	167.5	9.11	50.1	4.56	-	-	0.40	25.6	0.10	4.7×10^{-6}	3.9×10^{-6}	-	4.0×10^{-7}	-

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Table 3.1.6 (Continued)

Fuel Rods (6th Delivery)

No.	Original			First Impregnation							Second Impregnation						3rd Impr.	
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeability, $cm^2\ sec^{-1}$ (Press.Dec.)	(Vac. Dec.)	Remarks	Permeab. $cm^2\ sec^{-1}$ (Vac.Dec.)	Remarks
0329	5099.1	burst at 2,2 ata																
0330	5121.4	4.8×10^{-2}	-	109	160	8.09	52.8	4.26	-	-	0.24	13.9	0.03	6.7×10^{-4}	-	-	2.4×10^{-5}	-
0331	5102.2	burst at 2.0 ata																
0332	5120.5	4.2×10^{-2}	-	109	160	8.32	53.2	4.43	-	-	0.62	42.3	0.26	2.8×10^{-6}	1.2×10^{-6}	-	5.7×10^{-7}	-
0333	5122.5	5.1×10^{-2}	-	109	160	8.24	51.3	4.24	-	-	0.71	34.9	0.25	1.4×10^{-4}	-	-	2.9×10^{-6}	-
0334	5076.9	5.8×10^{-2}	-	317	115.3	9.41	51.3	4.84	1.3×10^{-4}	-	0.10	1.9	0.02	7.6×10^{-6}	6.0×10^{-6}	-	6.3×10^{-6}	-
0335	5066.7	7.7×10^{-2}	-	109	160	8.95	52.0	4.65	-	-	0.36	37.3	0.14	3.8×10^{-6}	1.1×10^{-6}	-	4.6×10^{-7}	-
0336	5119.4	5.1×10^{-2}	-	130	118.2	8.55	51.2	4.39	-	-	0.39	27.7	0.11	1.9×10^{-6}	2.4×10^{-6}	-	4.8×10^{-7}	-
0337	5095.7	8.2×10^{-2}	-	111	192	8.23	51.7	4.26	-	-	0.85	40.7	0.35	1.4×10^{-4}	-	-	1.1×10^{-6}	-
0338	5076.5	5.2×10^{-2}	-	338	167.5	8.52	50.8	4.33	-	-	0.39	31.7	0.12	1.9×10^{-6}	1.3×10^{-6}	-	2.8×10^{-7}	-
0339	5138.8	burst at 2.1 ata																
0340	5206.5	crack on receipt																
0341	5128.6	crack on receipt																
0342	5132.9	5.0×10^{-2}	-	317	115.3	9.08	52.1	4.73	-	-	0.68	44.3	0.30	$< 10^{-6}$	1.9×10^{-7}	-	-	-
0343	5191.6	burst at 2.4 ata																

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Table 3.1.7

Fuel Rods (7^{th} Delivery)

No.	Original			First Impregnation							Second Impregnation						3^{rd} Impr.	
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Carbon Yield %	Sec. Carb. Cont. %	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin-Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeability, $cm^2\ sec^{-1}$ (Press.Dec.)	(Vac. Dec.)	Remarks	Permeab. $cm^2\ sec^{-1}$ (Vac. Dec.)	Remarks
0344	5139.1	1.9×10^{-2}	-	146	120.0	7.50	51.1	3.83	-	-	0.13	23.5	0.03	8.3×10^{-6}	2.7×10^{-6}	-	3.7×10^{-6}	-
0345	5146.6	1.8×10^{-2}	-	146	110.0	7.63	50.4	3.84	-	-	0.14	10.8	0.02	1.2×10^{-5}	-	-	5.0×10^{-6}	-
0346	5137.0	2.3×10^{-2}	-	168	100.0	7.70	52.2	4.02	-	-	0.16	1.1	0.002	2.5×10^{-6}	-	-	1.0×10^{-5}	-
0347	5139.9	2.3×10^{-2}	-	162	104.5	7.75	52.1	4.04	-	-	0.09	28.0	0.03	5.7×10^{-5}	4.7×10^{-6}	-	1.4×10^{-5}	-
0348	5051.8	4.7×10^{-2}	-	162	104.5	6.95	50.9	3.54	-	-	2.02	49.0	0.99	2.7×10^{-5}	-	-	4.9×10^{-6}	-
0349	5158.8	1.9×10^{-2}	-	162	104.5	7.90	51.8	4.09	-	-	0.07	5.4	0.004	1.0×10^{-5}	-	-	1.0×10^{-5}	-
0350	5113.9	2.6×10^{-2}	-	146	120.0	7.95	50.8	4.04	-	-	0.02	(100.0)	0.02	1.2×10^{-5}	-	-	5.0×10^{-6}	-
0351	5003.7	8.7×10^{-2}	-	150	138.2	10.23	51.1	5.23	-	-	0.45	33.0	0.15	1.6×10^{-5}	-	-	8.1×10^{-6}	-
0352	5106.9	3.4×10^{-2}	-	146	110.0	8.39	55.4	4.65	5.9×10^{-5}	-	0.03	-	-	1.5×10^{-5}	1.6×10^{-5}	-	9.3×10^{-6}	-
0353	5122.3	2.6×10^{-2}	-	150	138.2	7.84	47.3	3.71	-	-	0.11	3.4	0.004	8.6×10^{-6}	4.2×10^{-6}	-	1.6×10^{-6}	-
0354	5166.1	1.9×10^{-2}	-	150	138.2	7.44	52.7	3.92	-	-	0.06	<0	-	1.5×10^{-5}	-	-	4.5×10^{-6}	-
0355	5208.4	1.0×10^{-2}	-	146	120.0	6.73	51.2	3.45	-	-	0.08	16.3	0.01	1.1×10^{-5}	-	-	2.1×10^{-6}	-
0356	5122.3	2.1×10^{-2}	-	146	120.0	8.08	55.5	4.48	-	-	0	-	-	1.1×10^{-5}	-	-	5.7×10^{-6}	-
0357	5131.7	2.2×10^{-2}	-	146	120.0	7.71	52.2	4.02	-	-	0.14	<0	-	1.2×10^{-5}	-	-	1.8×10^{-6}	-
0358	5132.6	2.5×10^{-2}	-	162	104.5	5.49	51.2	2.81	-	-	2.86	49.9	1.43	1.3×10^{-6}	-	-	6.8×10^{-6}	-
0359	5087.2	4.3×10^{-2}	-	168	100.0	8.26	51.9	4.29	1.5×10^{-4}	-	0.18	71.8	0.13	4.7×10^{-6}	4.7×10^{-6}	-	1.1×10^{-5}	-
0360	5139.4	2.3×10^{-2}	-	150	138.2	8.27	51.9	4.29	4.6×10^{-5}	-	0.10	<0	-	6.6×10^{-5}	3.6×10^{-6}	-	2.8×10^{-6}	-
0361	5162.6	1.6×10^{-2}	-	168	100.0	7.37	51.4	3.79	-	-	0.15	<0	-	4.1×10^{-5}	-	-	4.6×10^{-6}	-
0362	5106.7	3.9×10^{-2}	-	168	100.0	8.37	51.9	4.34	-	-	0.35	19.6	0.07	2.0×10^{-5}	-	-	3.8×10^{-7}	-
0363	5154.4	1.8×10^{-2}	-	146	110.0	7.82	50.7	3.96	-	-	0.08	<0	-	6.6×10^{-6}	2.7×10^{-6}	-	2.7×10^{-6}	-
0364	5172.2	1.7×10^{-2}	-	168	100.0	7.35	52.4	3.85	-	-	0.14	<0	-	1.4×10^{-5}	-	-	4.7×10^{-6}	-
0365	5158.5	1.6×10^{-2}	-	162	104.5	6.63	51.1	3.39	-	-	1.52	47.2	0.72	1.9×10^{-6}	1.1×10^{-6}	-	2.5×10^{-6}	-
0366	5111.7	3.1×10^{-2}	-	150	138.2	8.12	51.8	4.21	1.4×10^{-4}	-	0.24	24.4	0.06	7.5×10^{-6}	3.9×10^{-6}	-	2.7×10^{-6}	-
0367	5176.2	1.7×10^{-2}	-	168	100.0	7.73	51.3	3.96	-	-	0.08	4.9	0.004	3.8×10^{-5}	4.8×10^{-6}	-	1.4×10^{-5}	-
0368	5110.2	3.3×10^{-2}	-	162	104.5	8.36	52.8	4.41	2.0×10^{-4}	-	0.10	<0	-	1.1×10^{-5}	-	-	1.6×10^{-5}	-
0369	5162.8	2.3×10^{-2}	-	146	110.0	7.21	51.8	3.73	-	-	0.12	14.5	0.02	8.0×10^{-6}	2.6×10^{-6}	-	5.0×10^{-6}	-
0370	5125.2	2.8×10^{-2}	-	146	120.0	8.27	50.7	4.19	-	-	0.19	22.3	0.04	1.1×10^{-5}	-	-	4.6×10^{-6}	-
0371	5148.1	2.0×10^{-2}	-	162	104.5	7.42	51.7	3.84	-	-	0.12	<0	-	2.0×10^{-5}	-	-	7.4×10^{-6}	-

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Table 3.1.7 (Continued)

Fuel Rods (7^{th} Delivery)

No.	Original			First Impregnation							Second Impregnation						3rd Impr.	
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Carbon Yield %	Sec. Carb. Cont. %	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin-Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeability, $cm^2\ sec^{-1}$ (Press.Dec.)	(Vac. Dec.)	Remarks	Permeab. $cm^2\ sec^{-1}$ (Vac. Dec.)	Remarks
0372	5111.2	3.0×10^{-2}	-	146	120.0	7.73	51.0	3.94	1.6×10^{-3}	-	0.61	41.3	0.25	2.8×10^{-5}	-	-	1.5×10^{-5}	-
0373	5148.1	2.9×10^{-2}	-	146	120.0	7.39	48.5	3.58	-	-	0.55	39.5	0.22	1.3×10^{-4}	-	-	9.4×10^{-6}	-
0374	5159.4	2.1×10^{-2}	-	146	110.0	7.89	50.5	3.98	-	-	0.10	22.2	0.02	5.2×10^{-6}	1.6×10^{-6}	-	1.8×10^{-6}	-
0375	5137.6	2.1×10^{-2}	-	162	104.5	8.24	52.1	4.29	-	-	<0	-	-	1.5×10^{-5}	-	-	2.7×10^{-5}	-
0376	5087.6	3.8×10^{-2}	-	146	110.0	8.65	50.7	4.38	-	-	0.18	33.0	0.06	5.7×10^{-6}	2.4×10^{-6}	-	5.5×10^{-6}	1
0377	5106.2	3.1×10^{-2}	-	146	120.0	7.93	46.9	3.72	2.0×10^{-4}	-	0.11	5.2	0.006	2.1×10^{-5}	-	-	1.2×10^{-5}	-
0378	5147.3	2.0×10^{-2}	-	168	100.0	7.36	52.0	3.83	-	-	0.14	72.0	0.10	7.7×10^{-6}	5.8×10^{-6}	-	8.9×10^{-6}	-
0379	5083.2	4.0×10^{-2}	-	146	120.0	8.82	51.2	4.52	-	-	0.30	28.5	0.08	1.2×10^{-5}	-	-	5.2×10^{-6}	-
0380	5171.3	1.9×10^{-2}	-	146	120.0	7.31	50.3	3.68	-	-	0.10	30.3	0.03	1.0×10^{-5}	-	-	1.6×10^{-6}	-
0381	5151.3	2.0×10^{-2}	-	146	120.0	7.63	50.7	4.02	9.2×10^{-5}	-	0.11	14.7	0.02	1.3×10^{-5}	-	-	1.7×10^{-5}	-
0382	5127.7	2.5×10^{-2}	-	146	120.0	7.36	50.4	3.84	-	-	0.55	44.5	0.24	5.6×10^{-5}	-	-	5.7×10^{-6}	-
0383	5129.5	2.1×10^{-2}	-	146	120.0	5.74	56.9	3.27	-	-	1.35	41.0	0.55	1.5×10^{-5}	-	-	6.6×10^{-6}	-
0384	5131.6	2.3×10^{-2}	-	146	120.0	7.77	51.0	3.96	-	-	0.12	12.1	0.01	5.7×10^{-6}	3.1×10^{-6}	-	4.8×10^{-6}	-
0385	5086.1	4.6×10^{-2}	-	168	100.0	9.09	52.6	4.78	-	-	0.26	42.9	0.11	1.1×10^{-5}	-	-	6.0×10^{-6}	-
0386	5011.0	4.5×10^{-2}	-	146	120.0	9.87	56.5	5.58	-	-	0.28	8.2	0.02	1.1×10^{-5}	-	-	2.6×10^{-6}	-
0387	5138.9	2.1×10^{-2}	-	168	100.0	8.23	51.6	4.25	-	-	0.27	15.0	0.04	1.1×10^{-5}	-	-	4.3×10^{-6}	-
0388	5098.5	2.7×10^{-2}	-	168	100.0	7.12	52.1	3.71	-	-	0.70	53.0	0.37	1.6×10^{-4}	-	-	1.0×10^{-4}	-
0389	5194.6	1.3×10^{-2}	-	162	104.5	7.11	51.1	3.63	-	-	0.06	12.9	0.008	4.7×10^{-6}	3.2×10^{-6}	-	1.3×10^{-5}	-
0390	5087.4	2.7×10^{-2}	-	168	100.0	8.25	52.0	4.29	-	-	0.28	17.9	0.05	3.1×10^{-5}	-	-	2.9×10^{-6}	-
0391	5194.1	1.8×10^{-2}	-	162	104.5	6.46	44.6	2.88	6.8×10^{-5}	-	0.10	33.3	0.03	3.8×10^{-6}	4.4×10^{-6}	-	1.3×10^{-5}	-
0392	5090.0	5.0×10^{-2}	-	146	110.0	5.30	48.8	2.59	-	-	2.65	50.4	1.33	2.3×10^{-4}	-	-	2.2×10^{-5}	-
0393	5111.1	2.4×10^{-2}	-	146	110.0	7.40	55.0	4.07	8.9×10^{-5}	-	0.08	-	-	1.3×10^{-5}	1.3×10^{-5}	-	6.8×10^{-6}	-
0394	5107.5	3.1×10^{-2}	-	146	110.0	7.43	61.9	4.60	3.1×10^{-5}	-	0.03	-	-	1.4×10^{-5}	1.2×10^{-5}	-	1.9×10^{-6}	-
0395	5085.8	3.5×10^{-2}	-	168	100.0	7.96	53.2	4.23	-	-	0.26	57.3	0.15	1.0×10^{-5}	-	-	7.9×10^{-6}	-
0396	5092.2	4.4×10^{-2}	-	146	110.0	8.37	49.5	3.31	-	-	0.28	21.5	0.06	1.7×10^{-5}	-	-	1.0×10^{-5}	-
0397	5142.3	2.2×10^{-2}	-	146	110.0	7.81	51.1	3.99	-	-	0.06	<0	-	1.2×10^{-5}	-	-	4.0×10^{-6}	-
0398	5077.6	4.2×10^{-2}	-	146	110.0	9.09	50.6	4.60	-	-	0.20	<0	-	1.3×10^{-5}	-	-	3.1×10^{-6}	-

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Table 3.1.8

Fuel Rods (7th Delivery)

(Seven Element Rig)

No.	Original			First Impregnation							Second Impregnation						3rd Impr.	
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Carbon Yield %	Sec. Carb. Cont. %	Permeab. (press.dec.) $cm^2 sec^{-1}$	Remarks	Resin-Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeability, $cm^2\ sec^{-1}$ (Press.Dec.)	(Vac. Dec.)	Remarks	Permeab. $cm^2\ sec^{-1}$ (Vac.Dec.)	Remarks
B 1	4920.6	1.2×10^{-1}	-	150	138.2	9.85	51.9	5.11	-	-	0.70	38.8	0.27	1.1×10^{-5}	-	-	4.4×10^{-7}	1
B 2	4955.0	5.9×10^{-2}	-	150	138.2	8.66	51.3	4.44	-	-	0.22	22.1	0.05	1.9×10^{-6}	2.9×10^{-7}	-	-	-
B 3	5023.1	2.4×10^{-2}	-	79	120.0	7.06	45.8	3.23	-	-	0.53	40.4	0.21	4.0×10^{-5}	-	-	2.6×10^{-6}	-
B 4	4938.5	6.0×10^{-2}	-	150	138.2	9.46	52.0	4.92	-	-	0.22	19.0	0.04	6.6×10^{-6}	2.6×10^{-6}	-	-	-
B 5	4953.3	1.1×10^{-1}	-	79	120.0	9.42	50.3	4.74	-	-	1.15	45.4	0.52	8.0×10^{-6}	2.8×10^{-6}	-	-	-
B 6	4900.7	1.3×10^{-1}	-	77	99.0	9.67	54.5	5.27	-	-	2.22	41.0	0.91	1.2×10^{-5}	3.1×10^{-6}	-	-	-
B 7	4940.2	6.6×10^{-2}	-	524	95.5	8.21	52.4	4.30	-	-	0.32	13.2	0.04	2.8×10^{-6}	1.2×10^{-6}	-	-	-
B 8	4952.4	5.6×10^{-2}	-	524	95.5	8.53	52.0	4.43	-	-	0.33	13.3	0.04	3.8×10^{-6}	1.2×10^{-6}	-	-	-
B 9	5016.6	3.8×10^{-2}	-	524	95.5	7.66	51.3	3.93	-	-	0.34	14.1	0.05	4.5×10^{-5}	-	-	2.0×10^{-5}	-
B 10	4896.3	8.1×10^{-1}	-	524	95.5	9.43	50.6	4.77	-	-	0.50	27.9	0.14	1.2×10^{-3}	-	-	5.5×10^{-5}	-
B 11	4980.4	5.6×10^{-2}	-	231	110.5	7.94	48.2	3.83	-	-	0.29	40.8	0.12	1.4×10^{-5}	6.8×10^{-6}	-	-	-
B 12	5001.1	5.0×10^{-2}	-	524	95.5	7.82	50.7	3.96	-	-	0.25	10.6	0.03	3.0×10^{-5}	-	-	1.9×10^{-6}	-
B 13	4925.9	6.7×10^{-2}	-	231	110.5	9.49	49.5	4.70	-	-	0.40	28.3	0.11	1.1×10^{-6}	6.8×10^{-6}	-	4.0×10^{-6}	-
B 14	4940.6	7.3×10^{-2}	-	524	95.5	9.03	52.3	4.72	-	-	0.26	3.0	0.01	6.6×10^{-6}	3.6×10^{-6}	-	-	-
B 15	4887.6	1.5×10^{-1}	-	231	110.5	9.49	49.3	4.68	-	-	1.27	39.8	0.50	6.6×10^{-6}	4.3×10^{-6}	-	-	-
B 16	4889.1	1.2×10^{-1}	-	183	92.0	9.60	50.8	4.88	-	-	0.78	30.8	0.24	3.9×10^{-5}	-	-	4.7×10^{-6}	-
B 17	4962.3	1.0×10^{-1}	-	216	135.0	8.23	50.3	4.14	-	-	1.05	44.8	0.47	7.0×10^{-6}	6.4×10^{-6}	-	-	-
B 18	4909.0	1.2×10^{-1}	-	524	95.5	9.05	51.0	4.61	1.5×10^{-4}	-	0.34	12.7	0.04	1.1×10^{-5}	7.9×10^{-6}	-	-	-
B 19	4880.3	1.4×10^{-1}	-	216	135.0	9.76	46.1	4.50	-	-	2.24	45.9	1.03	2.3×10^{-5}	-	-	1.0×10^{-6}	-
B 20	4982.6	5.8×10^{-2}	-	150	138.2	8.21	52.7	4.33	-	-	0.22	20.5	0.04	not measureable	-	-	-	-
B 21	4963.3	6.1×10^{-2}	-	231	110.5	8.03	47.1	3.78	-	-	1.22	48.2	0.59	1.5×10^{-5}	4.6×10^{-6}	-	-	-
B 22	4875.0	1.9×10^{-1}	-	216	135.0	9.26	50.6	4.66	-	-	0.59	34.0	0.20	1.1×10^{-4}	-	-	1.3×10^{-5}	-
B 23	4953.5	7.6×10^{-2}	-	216	125.6	8.92	51.0	4.55	-	-	0.52	30.1	0.16	5.7×10^{-6}	2.8×10^{-6}	-	-	-
B 24	4939.6	1.1×10^{-1}	-	216	135.0	9.32	45.8	4.27	-	-	0.45	40.7	0.19	4.1×10^{-5}	-	-	5.0×10^{-6}	-
B 25	5002.8	4.7×10^{-2}	-	216	125.6	8.10	46.6	3.77	-	-	1.37	42.3	0.58	6.1×10^{-5}	-	-	8.3×10^{-6}	-
B 26	4860.0	1.6×10^{-1}	-	183	92.0	8.84	50.8	4.49	-	-	0.99	40.7	0.41	5.4×10^{-5}	-	-	3.9×10^{-6}	-
B 27	4964.1	9.4×10^{-2}	-	524	95.5	8.45	50.5	4.27	-	-	0.60	33.9	0.20	5.3×10^{-5}	-	-	2.2×10^{-6}	-
B 28	4962.5	6.0×10^{-2}	-	216	125.6	8.18	45.7	3.74	-	-	0.98	49.5	0.49	2.1×10^{-5}	-	-	6.2×10^{-6}	-

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Table 3.1.8 (Continued)

Fuel Rods (7th Delivery)

(Seven Element Rig)

No.	Original			First Impregnation							Second Impregnation						3rd Impr.	
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Carbon Yield %	Sec. Carb. Cont. %	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin-Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeability, $cm^2\ sec^{-1}$ (Press.Dec.)	(Vac. Dec.)	Remarks	Permeab. $cm^2\ sec^{-1}$ (Vac. Dec.)	Remarks
B 29	4965.6	5.9×10^{-2}	-	216	125.6	8.61	48.2	4.15	-	-	0.03	-	-	1.6×10^{-5}	1.7×10^{-5}	1	-	-
B 30	4930.2	2.7×10^{-2}	-	78	111.0	6.35	43.3	2.75	-	-	0.23	20.2	0.05	1.8×10^{-4}	-	-	6.4×10^{-6}	-
B 31	4970.0	5.7×10^{-2}	-	140	104.6	8.70	51.5	4.48	-	-	0.22	14.6	0.03	1.1×10^{-5}	6.9×10^{-6}	-	-	-
B 32	4888.1	1.4×10^{-1}	-	78	110.0	9.55	50.6	4.83	-	-	1.09	40.8	0.44	6.6×10^{-6}	2.0×10^{-6}	-	-	-
B 33	4989.5	4.7×10^{-2}	-	162	104.5	8.29	50.2	4.16	1.5×10^{-5}	-	0.21	78.5	0.16	3.8×10^{-6}	2.6×10^{-6}	-	2.1×10^{-6}	-
B 34	4857.1	1.6×10^{-1}	-	524	95.5	9.77	50.4	4.92	-	-	1.86	45.0	0.84	6.1×10^{-5}	-	-	5.2×10^{-6}	-
B 35	4875.0	burst at 6.6 ata																
B 36	4902.3	1.2×10^{-1}	-	524	95.5	9.99	45.4	4.50	1.8×10^{-3}	-	0.97	32.9	0.32	1.8×10^{-4}	-	-	2.2×10^{-6}	-
B 37	4869.4	2.0×10^{-1}	-	183	92.0	9.90	50.6	5.01	-	1	1.08	41.9	0.45	2.2×10^{-5}	-	-	2.3×10^{-6}	-
B 38	4810.4	2.2×10^{-1}	-	178	110.0	9.99	48.9	4.88	-	-	1.20	40.4	0.48	1.8×10^{-5}	-	-	2.0×10^{-6}	-
B 39	4934.1	7.6×10^{-2}	-	524	95.5	8.97	50.7	4.55	3.8×10^{-4}	-	0.82	35.5	0.29	8.1×10^{-6}	6.3×10^{-6}	-	-	-
B 40	4888.8	1.2×10^{-1}	-	150	138.2	9.99	47.8	4.77	-	-	0.82	36.6	0.30	4.7×10^{-6}	3.9×10^{-7}	-	-	-
B 41	4928.2	1.1×10^{-1}	-	144	85.0	9.43	50.5	4.76	-	-	0.43	35.9	0.15	2.8×10^{-5}	-	-	1.9×10^{-6}	-
B 42	4930.8	2.8×10^{-2}	-	140	104.6	7.77	49.2	3.82	-	-	0.20	20.9	0.04	1.1×10^{-5}	2.3×10^{-6}	-	-	-
B 43	4926.3	8.0×10^{-2}	-	150	138.2	8.79	52.1	4.58	2.7×10^{-4}	-	0.82	-	-	6.6×10^{-6}	7.9×10^{-7}	2	-	-
B 44	4891.5	1.7×10^{-1}	-	524	95.5	9.31	50.5	4.70	-	-	1.71	43.2	0.74	1.7×10^{-4}	-	-	5.5×10^{-6}	-
B 45	4910.8	6.8×10^{-2}	-	524	95.5	8.59	51.8	4.45	2.2×10^{-4}	-	0.58	24.1	0.14	8.5×10^{-5}	-	-	2.0×10^{-5}	-
B 46	4980.7	6.0×10^{-2}	-	524	95.5	8.22	50.6	4.16	-	-	2.29	2.9	0.07	4.3×10^{-5}	-	-	3.9×10^{-6}	-
B 47	4947.9	7.0×10^{-2}	-	216	125.6	8.42	47.8	4.02	-	-	0.78	42.5	0.33	6.6×10^{-6}	3.7×10^{-6}	-	-	-
B 48	4946.8	6.6×10^{-2}	-	216	125.6	9.04	47.5	4.29	-	-	0.26	7.5	0.02	1.6×10^{-5}	1.9×10^{-5}	-	1.2×10^{-5}	-
B 49	4903.5	7.6×10^{-2}	-	216	125.6	9.27	48.0	4.45	-	-	0.87	40.5	0.35	6.6×10^{-6}	2.0×10^{-6}	-	-	-
B 50	4831.2	1.2×10^{-1}	-	216	125.6	9.49	48.0	4.55	-	-	0.99	38.7	0.38	1.9×10^{-5}	8.0×10^{-6}	-	6.3×10^{-6}	-
B 51	4982.2	5.9×10^{-2}	-	77	99.0	9.15	51.5	4.71	-	-	0.30	33.1	0.10	5.7×10^{-6}	1.1×10^{-6}	-	-	-
B 52	4885.1	1.0×10^{-1}	-	79	120.0	9.65	51.0	4.92	-	-	1.93	45.9	0.89	4.7×10^{-6}	2.5×10^{-6}	-	-	-
B 53	4947.6	8.7×10^{-2}	-	168	110.0	8.63	51.3	4.43	-	-	0.31	21.5	0.07	1.0×10^{-5}	-	-	5.7×10^{-6}	1
B 54	4938.0	7.3×10^{-2}	-	168	110.0	9.10	51.6	4.69	-	-	0.33	29.2	0.10	1.1×10^{-5}	-	-	1.0×10^{-5}	-
B 55	4978.9	2.4×10^{-2}	-	77	99.0	7.90	48.6	3.84	6.6×10^{-5}	-	0.08	0	-	1.6×10^{-5}	1.2×10^{-5}	-	9.0×10^{-6}	-
B 56	4932.5	7.3×10^{-2}	-	78	111.0	8.60	51.0	4.39	-	-	0.32	28.7	0.09	3.8×10^{-5}	-	-	1.4×10^{-5}	-

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Table 3.1.8 (Continued)

Fuel Rods (7th Delivery)

(Seven Element Rig)

No.	Original			First Impregnation							Second Impregnation						3rd Impr.	
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Carbon Yield %	Sec. Carb. Cont. %	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin-Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeability, $cm^2\ sec^{-1}$ (Press. Dec.)	(Vac. Dec.)	Remarks	Permeab. $cm^2\ sec^{-1}$ (Vac.Dec.)	Remarks
B 57	4974.9	5.3×10^{-2}	-	144	85.0	9.23	50.7	4.68	-	-	0.21	14.7	0.03	1.5×10^{-5}	1.1×10^{-5}	-	-	-
B 58	4987.1	5.1×10^{-2}	-	78	111.0	8.15	49.0	3.99	-	-	0.21	12.1	0.03	1.1×10^{-5}	8.7×10^{-6}	-	3.0×10^{-5}	-
B 59	4867.1	1.3×10^{-1}	-	140	104.6	10.18	51.3	5.22	5.5×10^{-4}	-	0.99	33.1	0.33	2.8×10^{-6}	4.1×10^{-7}	-	-	-
B 60	4946.8	7.3×10^{-2}	-	162	104.5	6.29	49.9	3.14	-	-	3.03	42.8	1.30	4.4×10^{-3}	-	-	1.2×10^{-4}	-
B 61	4944.8	6.0×10^{-2}	-	78	111.1	8.27	49.6	4.10	-	-	0.61	34.6	0.21	1.0×10^{-5}	7.3×10^{-6}	-	1.9×10^{-6}	-
B 63	4896.2	1.1×10^{-1}	-	140	104.6	9.53	51.5	4.91	-	-	0.37	19.5	0.07	3.6×10^{-5}	-	-	6.4×10^{-6}	-
B 64	5037.5	3.1×10^{-2}	-	140	104.6	7.48	49.4	3.69	-	-	0.20	23.0	0.05	2.1×10^{-5}	-	-	2.7×10^{-6}	-
B 65	4910.8	7.5×10^{-2}	-	144	85.0	9.52	51.4	4.89	1.5×10^{-4}	1	0.24	16.7	0.04	2.8×10^{-6}	2.1×10^{-6}	-	-	-
B 66	4941.6	7.1×10^{-2}	-	140	104.6	8.52	51.0	4.34	-	-	0.39	39.0	0.15	2.1×10^{-5}	-	-	3.8×10^{-6}	-
B 67	4946.2	9.6×10^{-2}	-	79	120.0	9.20	50.3	4.63	1.9×10^{-3}	-	0.74	37.9	0.27	1.1×10^{-4}	-	-	4.4×10^{-6}	-
B 68	4868.6	1.1×10^{-1}	-	78	111.0	9.54	50.8	4.85	-	-	0.84	37.4	0.32	1.3×10^{-5}	3.0×10^{-6}	-	-	-
B 69	4865.4	1.5×10^{-1}	-	150	138.2	9.83	52.5	5.16	-	-	1.49	-	-	-	-	2	-	-
B 70	4909.0	burst at 3.6 ata																
B 71	4890.5	1.3×10^{-1}	-	168	110.0	9.50	49.0	4.65	-	-	1.99	45.6	0.91	5.7×10^{-6}	7.7×10^{-7}	-	-	-
B 72	5064.1	2.7×10^{-2}	-	168	110.0	7.09	48.1	3.41	-	-	0.19	10.9	0.02	1.6×10^{-5}	9.9×10^{-6}	-	3.9×10^{-6}	-
B 73	4873.1	1.4×10^{-1}	-	77	99.0	10.03	50.9	5.10	-	-	1.28	40.7	0.52	1.8×10^{-5}	1.2×10^{-5}	-	1.4×10^{-5}	1
B 74	4900.5	1.4×10^{-1}	-	140	104.6	9.96	51.4	5.12	5.0×10^{-4}	-	0.79	41.9	0.33	8.0×10^{-6}	-	-	3.0×10^{-6}	-
B 75	4873.7	1.2×10^{-1}	-	78	111.0	8.96	48.3	4.33	-	-	1.94	43.4	0.84	6.6×10^{-6}	1.2×10^{-6}	-	-	-
B 76	4886.7	1.3×10^{-1}	-	140	104.6	9.99	52.4	5.23	6.2×10^{-4}	-	0.67	28.3	0.19	1.6×10^{-5}	5.0×10^{-6}	-	8.2×10^{-7}	-

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Table 3.1.9

Fuel Rods (8^{th} Delivery)

No.	Original			First Impregnation							Sec. Impregnation						3rd Impr.	
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Carbon Yield %	Sec. Carb. Cont. %	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin-Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeability, $cm^2\ sec^{-1}$ (Press. Dec.)	(Vac. Dec.)	Remarks	Permeab. $cm^2\ sec^{-1}$ (Vac. Dec.)	Remarks
0399	5120.1	4.2×10^{-2}	-	168	95	8.86	51.9	4.60	1.7×10^{-4}	-	0.29	29.7	0.09	3.8×10^{-6}	4.2×10^{-6}	-	3.8×10^{-6}	-
0400	5263.8	8.5×10^{-3}	-	168	95	6.01	51.8	3.13	-	-	0.12	10.9	0.01	3.8×10^{-6}	2.3×10^{-6}	-	1.1×10^{-6}	-
0401	5090.0	3.6×10^{-2}	-	168	95	8.35	51.9	4.37	-	-	0.17	24.4	0.04	4.7×10^{-6}	3.4×10^{-6}	-	3.3×10^{-6}	-
0402	5201.1	2.7×10^{-2}	-	168	95	7.03	51.8	3.64	-	-	0.18	27.3	0.05	3.8×10^{-6}	2.8×10^{-6}	-	3.2×10^{-6}	-
0403	5196.4	2.8×10^{-2}	-	168	95	8.04	51.9	4.17	-	-	0.11	8.2	0.009	6.6×10^{-6}	5.5×10^{-6}	-	3.0×10^{-6}	-
0404	5254.3	1.1×10^{-2}	-	168	95	6.11	51.4	3.15	-	-	0.11	<0	-	3.8×10^{-6}	3.8×10^{-6}	-	1.7×10^{-6}	-
0405	5200.0	2.0×10^{-2}	-	168	95	7.27	52.0	3.76	-	-	0.16	15.5	0.02	2.8×10^{-6}	2.8×10^{-6}	-	2.1×10^{-6}	-
0406	5206.5	2.0×10^{-2}	-	168	95	7.31	51.7	3.76	-	-	0.11	14.7	0.02	6.6×10^{-6}	5.7×10^{-6}	-	3.3×10^{-6}	-
0407	5178.0	3.3×10^{-2}	-	168	95	7.82	50.8	3.96	-	-	0.24	24.2	0.06	5.7×10^{-6}	6.5×10^{-6}	-	7.1×10^{-6}	-
0408	5222.3	1.9×10^{-2}	-	168	154	6.56	51.3	3.37	-	-	0.10	7.5	0.008	1.9×10^{-6}	5.3×10^{-6}	-	7.9×10^{-7}	-
0409	5224.9	2.1×10^{-2}	-	168	154	7.28	52.4	3.82	-	-	0.13	17.8	0.02	1.1×10^{-5}	-	-	1.9×10^{-6}	-
0410	5222.9	1.5×10^{-2}	-	168	154	6.12	51.0	3.12	-	-	0.37	35.3	0.13	5.7×10^{-6}	2.8×10^{-6}	-	1.6×10^{-6}	-
0411	5221.8	2.3×10^{-2}	-	168	154	7.13	52.7	3.76	-	-	0.10	24.6	0.02	1.1×10^{-5}	-	-	2.4×10^{-6}	-
0412	5238.0	1.9×10^{-2}	-	168	95	6.76	51.8	3.50	-	-	0.18	18.5	0.03	4.7×10^{-6}	4.1×10^{-6}	-	2.1×10^{-6}	-
0413	5311.0	1.0×10^{-2}	-	168	95	6.04	-	-	-	2	-	-	-	-	-	-	-	-
0414	5189.4	2.0×10^{-2}	-	168	95	7.59	51.8	3.93	-	-	0.09	0	-	6.6×10^{-6}	9.7×10^{-6}	-	4.6×10^{-6}	-
0415	5266.9	1.5×10^{-2}	-	168	154	5.78	50.6	2.93	-	-	0.12	16.4	0.02	3.8×10^{-6}	1.3×10^{-6}	-	8.9×10^{-7}	-
0416	5207.3	2.0×10^{-2}	-	168	154	5.91	51.1	3.02	-	-	0.27	33.3	0.09	3.8×10^{-6}	2.8×10^{-6}	-	1.9×10^{-6}	-
0417	5238.0	1.7×10^{-2}	-	168	95	7.52	50.6	3.81	-	-	0.01	0	-	1.0×10^{-5}	-	-	4.5×10^{-6}	-
0418	5238.0	2.4×10^{-2}	-	168	154	6.51	51.0	3.32	3.0×10^{-4}	-	0.18	25.2	0.05	8.4×10^{-6}	9.6×10^{-6}	-	5.2×10^{-6}	-
0419	5307.4	9.3×10^{-3}	-	168	95	5.44	-	-	-	2	-	-	-	-	-	-	-	-
0420	5210.5	2.2×10^{-2}	-	168	95	7.56	51.3	3.88	-	-	0.07	0	-	1.2×10^{-5}	-	-	6.7×10^{-6}	-
0421	5148.7	3.3×10^{-2}	-	168	95	7.77	50.7	3.94	-	-	0.34	29.0	0.10	8.4×10^{-6}	9.7×10^{-6}	-	5.7×10^{-6}	-
0422	5139.3	3.6×10^{-2}	-	168	95	7.99	62.5	4.99	-	-	0.63	37.2	0.21	4.7×10^{-6}	5.7×10^{-6}	-	6.9×10^{-6}	-
0423	5157.4	3.4×10^{-2}	-	168	95	7.55	50.7	3.83	-	-	0.17	17.0	0.03	5.7×10^{-6}	5.0×10^{-6}	-	2.7×10^{-6}	-
0424	5266.9	8.4×10^{-3}	-	168	95	5.81	51.3	2.97	2.9×10^{-5}	-	0.12	11.1	0.01	4.7×10^{-6}	3.8×10^{-6}	-	1.6×10^{-6}	-
0425	5203.4	2.4×10^{-2}	-	168	154	7.71	51.2	3.95	-	-	0.09	6.1	0.005	1.1×10^{-5}	-	-	4.7×10^{-6}	-
0426	5295.8	1.3×10^{-2}	-	168	154	6.56	-	-	-	2	-	-	-	-	-	-	-	-
0427	5135.0	2.7×10^{-2}	-	168	154	8.63	51.4	4.44	-	-	0.11	9.8	0.01	3.8×10^{-6}	4.5×10^{-6}	-	2.9×10^{-6}	-
0428	5302.1	1.1×10^{-2}	-	168	154	6.30	-	-	-	2	-	-	-	-	-	-	-	-
0429	5225.1	2.7×10^{-2}	-	168	154	7.37	52.4	3.86	1.4×10^{-4}	-	0.22	40.8	0.09	3.8×10^{-6}	5.5×10^{-6}	-	2.4×10^{-6}	-

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Table 3.1.10

Fuel Rods (9^{th} Delivery)

No.	Original			First Impregnation							Second Impregnation						3rd Impr.	
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Carbon Yield %	Sec. Carb. Cont. %	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin-Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeability, $cm^2 sec^{-1}$ (Press. Dec.)	(Vac. Dec.)	Remarks	Permeab. $cm^2\ sec^{-1}$ (Vac.Dec.)	Remarks
0430	5169	2.0×10^{-2}	-	220	238	6.17	51.2	3.18	-	-	1.14	50.0	0.57	5.9×10^{-5}	-	-	8.7×10^{-8}	-
0431	5151	2.9×10^{-2}	-	144	94	8.12	51.7	4.19	-	-	0.15	29.1	0.04	1.9×10^{-6}	7.5×10^{-7}	-	-	-
0432	5100	3.4×10^{-2}	-	144	94	8.00	51.1	4.09	-	-	0.12	14.0	0.02	3.9×10^{-6}	2.0×10^{-6}	-	1.0×10^{-6}	-
0433	5180	3.1×10^{-2}	-	144	94	7.96	51.1	4.06	-	-	0.21	13.9	0.03	1.9×10^{-6}	1.6×10^{-6}	-	4.6×10^{-7}	-
0434	5193	1.6×10^{-2}	-	144	140	6.78	57.6	3.83	-	-	0.07	11.1	0.01	9.5×10^{-7}	5.7×10^{-7}	-	-	-
0435	5215	1.8×10^{-2}	-	144	140	7.27	51.3	3.74	-	-	0.10	22.2	0.02	1.9×10^{-6}	8.3×10^{-7}	-	-	-
0436	5150	2.1×10^{-2}	-	144	140	7.89	52.1	4.11	1.3×10^{-5}	-	0.05	0	0	9.5×10^{-7}	5.0×10^{-7}	-	-	-
0437	5243	1.6×10^{-2}	-	168	134	7.31	51.0	3.73	2.4×10^{-5}	-	0.04	0	0	2.8×10^{-6}	1.5×10^{-6}	-	3.5×10^{-7}	-
0438	5114	3.5×10^{-2}	-	220	238	8.45	51.3	4.34	-	-	0.14	6.8	0.01	3.8×10^{-6}	2.3×10^{-6}	-	1.3×10^{-7}	-
0439	5190	1.7×10^{-2}	-	144	94	6.57	57.6	3.85	-	-	0.14	0	0	4.8×10^{-6}	1.9×10^{-6}	-	4.1×10^{-7}	-
0440	5274	9.9×10^{-3}	-	144	94	6.51	51.1	3.33	-	-	0.10	15.0	0.02	1.9×10^{-6}	4.6×10^{-7}	-	-	-
0441	5134	2.6×10^{-2}	-	220	238	7.64	51.3	3.94	-	-	0.25	28.1	0.07	8.4×10^{-6}	5.2×10^{-6}	-	7.4×10^{-8}	-
0442	5270	1.1×10^{-2}	-	168	200	6.30	50.9	3.21	-	-	0.10	0	0	2.8×10^{-6}	7.9×10^{-7}	-	-	-
0443	5249	1.5×10^{-2}	-	168	70	8.46	43.1	3.65	-	-	0.09	25.6	0.02	3.8×10^{-6}	2.7×10^{-6}	-	2.0×10^{-6}	-
0444	5090	3.7×10^{-2}	-	144	95	8.13	51.8	4.21	-	-	0.31	36.0	0.11	$< 10^{-6}$	3.0×10^{-7}	-	-	-
0445	5178	3.1×10^{-2}	-	144	140	8.08	51.1	4.13	-	-	0.17	25.9	0.04	2.8×10^{-6}	8.3×10^{-7}	-	-	-
0446	5171	1.7×10^{-2}	-	168	180	7.58	50.7	3.84	4.7×10^{-6}	-	0.07	0	0	9.5×10^{-7}	1.3×10^{-7}	-	-	-
0447	5149	2.8×10^{-2}	-	168	180	8.02	51.3	4.12	-	-	0.08	0	0	3.8×10^{-6}	1.6×10^{-7}	-	-	-
0448	5221	1.6×10^{-2}	-	240	200	6.63	50.6	3.34	-	-	0.23	35.1	0.08	9.5×10^{-7}	2.4×10^{-7}	-	-	-
0449	5236	1.6×10^{-2}	-	144	94	7.13	50.3	3.59	-	-	0.03	0	0	7.6×10^{-6}	1.7×10^{-6}	-	8.0×10^{-7}	-
0450	5149	2.2×10^{-2}	-	144	94	8.19	56.0	4.58	-	-	0.09	23.9	0.02	4.8×10^{-6}	1.4×10^{-6}	-	1.9×10^{-6}	-
0451	5130	3.9×10^{-2}	-	168	70	8.83	50.4	4.45	-	-	0.15	22.8	0.03	7.6×10^{-6}	1.9×10^{-6}	-	1.0×10^{-6}	-
0452	5130	3.5×10^{-2}	-	168	70	8.30	49.6	4.41	4.1×10^{-5}	-	0.11	13.3	0.02	1.9×10^{-6}	5.2×10^{-7}	-	-	-
0453	5167	3.6×10^{-2}	-	168	81.5	7.76	51.0	3.96	-	-	1.08	46.2	0.50	1.9×10^{-6}	7.9×10^{-7}	-	-	-
0454	5161	2.0×10^{-2}	-	168	200	8.08	51.1	4.13	-	-	0.08	20.9	0.02	2.8×10^{-6}	9.1×10^{-7}	-	-	-
0455	5173	burst at 8.0 ata																
0456	5189	3.3×10^{-2}	-	144	140	7.51	51.2	3.84	-	-	0.09	11.5	0.01	7.6×10^{-6}	5.0×10^{-6}	-	3.0×10^{-6}	-
0457	5158	4.0×10^{-2}	-	144	140	7.53	54.6	4.11	2.6×10^{-5}	-	0.14	34.5	0.05	1.9×10^{-6}	9.7×10^{-7}	-	-	-
0458	5164	2.1 x 10-2	-	216	96	7.55	52.6	3.98	-	-	0.48	42.5	0.20	3.8 x 10-6	5.7×10^{-7}	-	-	-

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Table 3.1.10 (Continued)

Fuel Rods (9th Delivery)

No.	Original			First Impregnation							Second Impregnation						3rd Impr.	
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Carbon Yield %	Sec. Carb. Cont. %	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin-Uptake %	Carbon Yield %	Sec. Carb. Cont. %	Permeability, $cm^2\ sec^{-1}$ (Press. Dec.)	(Vac. Dec.)	Remarks	Permeab. $cm^2\ sec^{-1}$ (Vac. Dec.)	Remarks
0459	5187	2.5×10^{-2}	-	168	140	7.91	51.0	4.03	-	-	0.05	0	0	1.1×10^{-5}	-	-	9.3×10^{-7}	-
0460	5080	8.6×10^{-2}	-	168	140	9.10	47.6	4.33	-	-	0.51	41.5	0.21	5.7×10^{-6}	2.0×10^{-6}	-	1.0×10^{-7}	-
0461	5126	4.8×10^{-2}	-	168	70	8.65	50.2	4.34	-	-	0.22	29.1	0.07	3.8×10^{-6}	9.3×10^{-7}	-	-	-
0462	5139	3.6×10^{-2}	-	168	260	8.38	50.3	4.22	-	-	0.22	34.2	0.07	4.8×10^{-6}	3.1×10^{-6}	-	2.7×10^{-7}	-
0463	5167	2.1×10^{-2}	-	216	238	7.38	51.2	3.78	-	-	0.21	36.2	0.07	2.8×10^{-6}	1.6×10^{-6}	-	3.8×10^{-7}	-
0464	5151	2.7×10^{-2}	-	216	238	7.67	51.6	3.96	-	-	0.54	46.5	0.25	2.8×10^{-6}	1.5×10^{-6}	-	1.8×10^{-7}	-
0465	5124	4.0×10^{-2}	-	216	238	7.80	51.5	4.01	-	-	0.54	39.2	0.21	2.8×10^{-6}	1.0×10^{-6}	-	-	-
0466	5193	1.8×10^{-2}	-	168	81.5	6.94	51.5	3.55	-	-	0.36	37.1	0.13	3.8×10^{-6}	2.2×10^{-6}	-	1.1×10^{-7}	-
0467	5133	4.0×10^{-2}	-	144	94	8.32	50.2	4.18	-	-	0.19	32.6	0.06	1.9×10^{-6}	1.3×10^{-7}	-	-	-
0468	5159	3.2×10^{-2}	-	240	200	8.12	51.7	4.20	-	-	0.14	11.0	0.01	4.8×10^{-6}	2.0×10^{-6}	-	1.3×10^{-7}	-
0469	5124	5.1×10^{-2}	-	168	70	8.65	50.8	4.39	1.8×10^{-4}	-	0.26	29.9	0.09	7.6×10^{-6}	3.2×10^{-6}	-	1.3×10^{-6}	-
0470	5140	2.2×10^{-2}	-	240	270	7.70	52.1	4.01	1.2×10^{-4}	-	0.35	35.6	0.12	2.8×10^{-6}	6.7×10^{-7}	-	-	-
0471	5084	6.1×10^{-2}	-	240	270	8.07	51.2	4.16	1.3×10^{-3}	-	1.70	41.5	0.73	4.8×10^{-6}	1.1×10^{-6}	-	5.3×10^{-8}	-
0472	5110	5.3×10^{-2}	-	168	75	8.59	49.9	4.29	6.9×10^{-5}	-	0.14	4.15	0.0	4.4×10^{-6}	2.0×10^{-6}	-	8.9×10^{-7}	-
0473	5125	4.0×10^{-2}	-	240	72	7.87	51.1	4.02	-	-	0.33	43.7	0.14	1.9×10^{-6}	8.6×10^{-7}	-	-	-
0474	5005	6.4×10^{-2}	-	240	200	10.47	56.5	5.91	-	-	0.46	35.9	0.17	$< 10^{-6}$	2.9×10^{-7}	-	-	-
0475	5112	4.3×10^{-2}	-	168	240	8.34	50.4	4.20	1.3×10^{-4}	-	0.19	4.85	0.01	5.7×10^{-6}	3.7×10^{-6}	-	2.2×10^{-7}	-
0476	5126	3.0×10^{-2}	-	168	240	8.05	51.0	4.10	-	-	0.41	42.3	0.17	3.8×10^{-6}	4.2×10^{-7}	-	-	-
0477	5133	2.6×10^{-2}	-	168	240	7.87	51.4	4.05	1.3×10^{-4}	-	0.29	28.7	0.07	1.1×10^{-5}	-	-	2.6×10^{-7}	-
0478	5187	1.6×10^{-2}	-	216	238	7.14	51.3	3.66	-	-	0.39	42.3	0.17	1.9×10^{-6}	5.9×10^{-7}	-	-	-
0479	5161	3.3×10^{-2}	-	168	140	7.33	49.7	3.54	-	-	0.26	41.0	0.10	5.7×10^{-6}	5.0×10^{-6}	-	4.3×10^{-6}	-
0480	5174	3.2×10^{-2}	-	168	134	7.98	50.2	4.01	-	-	0.16	24.7	0.04	2.8×10^{-6}	4.0×10^{-7}	-	-	-
0481	5140	3.9×10^{-2}	-	168	260	8.37	48.6	4.07	-	-	0.19	15.0	0.03	2.8×10^{-6}	1.1×10^{-6}	-	3.3×10^{-7}	-
0482	5168	3.9×10^{-2}	-	168	260	8.05	48.4	3.90	-	-	0.17	0	0	$< 10^{-6}$	2.3×10^{-6}	-	1.6×10^{-7}	-
0483	5175	1.8×10^{-2}	-	168	134	8.14	50.5	4.11	-	-	0.07	0	0	1.2×10^{-5}	-	-	7.5×10^{-7}	-
0484	5144	4.0×10^{-2}	-	168	260	8.29	48.8	4.05	-	-	0.18	16.4	0.03	3.8×10^{-6}	3.2×10^{-6}	-	3.4×10^{-7}	-
0485	5204	2.2×10^{-2}	-	168	140	7.71	50.6	3.90	-	-	0.09	6.4	0.01	5.1×10^{-6}	4.5×10^{-6}	-	5.1×10^{-7}	-
0486	5098	3.4×10^{-2}	-	144	140	7.36	51.6	3.80	-	-	0.31	32.7	0.10	9.5×10^{-7}	4.7×10^{-7}	-	-	-

Table 3.1.10 (Continued)

Fuel Rods (9^{th} Delivery)

No.	Original			First Impregnation							Second Impregnation						3rd Impr.	
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Carbon Yield %	Sec. Carb. Cont. %	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin-Uptake %	Carbon Yield %	Sec. Carb. Cont. %	Permeability, $cm^2\ sec^{-1}$ (Press. Dec.)	(Vac. Dec.)	Remarks	Permeab. $cm^2\ sec^{-1}$ (Vac. Dec.)	Remarks
0487	5114	1.7×10^{-2}	-	168	260	7.30	49.2	3.59	-	-	0.25	39.3	0.10	4.8×10^{-6}	2.0×10^{-6}	-	1.1×10^{-7}	-
0488	5157	2.2×10^{-2}	-	240	72	7.73	52.7	4.07	-	-	0.31	33.6	0.10	3.8×10^{-6}	1.9×10^{-6}	-	2.1×10^{-7}	-
0489	5172	2.8×10^{-2}	-	144	140	7.58	52.0	3.94	2.3×10^{-5}	-	0.08	15.3	0.01	4.8×10^{-6}	2.4×10^{-6}	-	7.7×10^{-7}	-
0490	5156	3.7×10^{-2}	-	168	85	8.02	50.3	4.06	-	-	0.10	0	0	3.8×10^{-6}	1.9×10^{-6}	-	1.7×10^{-6}	-
0491	5170	2.4×10^{-2}	-	168	85	7.57	52.8	4.00	-	-	0.12	0	0	1.9×10^{-6}	1.2×10^{-6}	-	3.9×10^{-8}	-
0492	5117	4.4×10^{-2}	-	168	70	8.75	50.6	4.43	-	-	0.36	spalled during 2^{nd} baking						
0493	5192	2.0×10^{-2}	-	144	94	7.69	51.7	3.98	-	-	0.19	38.0	0.08	2.8×10^{-6}	4.7×10^{-7}	-	-	-
0494	5128	2.7×10^{-2}	-	240	70	7.66	53.6	4.10	-	-	0.30	35.8	0.10	3.8×10^{-6}	1.9×10^{-6}	-	2.9×10^{-7}	-
0496	5147	4.2×10^{-2}	-	168	240	8.31	50.8	4.22	-	-	0.27	28.7	0.09	2.8×10^{-6}	2.0×10^{-6}	-	5.8×10^{-7}	-
0498	5179	2.8×10^{-2}	-	168	70	8.03	50.2	4.03	-	-	0.07	0	0	1.9×10^{-6}	5.2×10^{-7}	-	-	-
0499	5142	3.6×10^{-2}	-	168	85	8.35	50.0	4.18	-	-	0.10	0	0	1.9×10^{-6}	1.6×10^{-6}	-	2.7×10^{-6}	-
0500	5176	2.3×10^{-2}	-	216	96	7.82	50.8	3.97	-	-	0.31	36.1	0.10	2.8×10^{-6}	1.5×10^{-6}	-	6.0×10^{-8}	-
0501	5114	7.2×10^{-2}	-	144	117	9.12	49.2	4.49	-	-	1.34	39.7	0.53	2.8×10^{-6}	8.1×10^{-7}	-	-	-
0502	5166	3.5×10^{-2}	-	144	117	7.88	51.4	4.05	-	-	0.26	38.7	0.10	1.9×10^{-6}	2.0×10^{-6}	-	-	-
0503	5160	2.9×10^{-2}	-	168	260	8.29	51.1	4.24	-	-	0.25	37.5	0.09	$< 10^{-6}$	1.2×10^{-6}	-	9.4×10^{-8}	-
0504	5142	1.8×10^{-2}	-	144	117	7.59	50.8	3.86	-	-	0.18	30.0	0.06	$< 10^{-6}$	8.4×10^{-7}	-	-	-
0505	5169	3.2×10^{-2}	-	144	117	7.75	50.9	3.94	-	-	0.25	32.8	0.08	3.8×10^{-6}	1.1×10^{-6}	-	9.7×10^{-8}	-
0506	5134	2.5×10^{-2}	-	168	134	8.66	50.4	4.36	-	-	0.10	15.7	0.02	5.3×10^{-6}	4.8×10^{-6}	-	1.9×10^{-6}	-
0507	5167	2.4×10^{-2}	-	168	134	7.81	50.4	3.94	-	-	0.08	16.7	0.02	4.8×10^{-6}	1.7×10^{-6}	-	5.4×10^{-7}	-
0508	5079	5.0×10^{-2}	-	168	80.4	8.92	50.6	4.51	1.8×10^{-4}	-	0.38	38.6	0.15	1.9×10^{-6}	3.1×10^{-6}	-	-	-
0509	5154	2.7×10^{-2}	-	216	238	8.35	51.8	4.33	-	-	0.17	18.9	0.03	4.8×10^{-6}	6.3×10^{-6}	-	3.5×10^{-7}	-
0510	5129	2.5×10^{-2}	-	144	95	8.30	51.1	4.24	-	-	0.10	3.96	0.0	3.8×10^{-6}	1.2×10^{-6}	-	1.3×10^{-6}	-
0511	5185	2.2×10^{-2}	-	168	70	8.07	51.1	4.12	2.2×10^{-5}	-	0.03	0	0	2.8×10^{-6}	7.3×10^{-7}	-	-	-
0512	5118	4.6×10^{-2}	-	144	94	8.56	51.8	4.44	-	-	0.43	35.1	0.15	4.8×10^{-6}	1.5×10^{-6}	-	8.9×10^{-7}	-
0513	5189	1.8×10^{-2}	-	168	80.4	7.63	50.7	3.87	-	-	0.23	0	0	4.8×10^{-6}	4.5×10^{-6}	-	5.7×10^{-6}	-
0514	5148	3.3×10^{-2}	-	168	70	8.09	50.6	4.09	-	-	0.10	8.9	0.01	2.8×10^{-6}	2.6×10^{-6}	-	2.4×10^{-6}	-
0515	5164	2.5×10^{-2}	-	168	80.4	8.10	51.1	4.14	-	-	0.05	0	0	7.0×10^{-6}	6.0×10^{-7}	-	1.0×10^{-6}	-
0516	5220	1.7×10^{-2}	-	168	70	7.26	50.6	3.67	-	-	0.05	0	0	2.8×10^{-6}	6.4×10^{-7}	-	-	-

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Table 3.1.10 (Continued)

Fuel Rods (9th Delivery)

No.	Original			First Impregnation							Second Impregnation						3rd Impr.	
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Carbon Yield %	Sec. Carb. Cont. %	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin-Uptake %	Carbon Yield %	Sec. Carb. Cont. %	Permeability, $cm^2\ sec^{-1}$ (Press.Dec.)	(Vac. Dec.)	Remarks	Permeabil. $cm^2\ sec^{-1}$ (Vac. Dec.)	Remarks
0517	5134	3.5×10^{-2}	-	168	70	8.01	50.3	4.03	4.5×10^{-5}	-	0.11	17.2	0.02	2.8×10^{-6}	9.4×10^{-7}	-	-	-
0518	5129	3.7×10^{-2}	-	168	70	8.52	50.0	4.26	-	-	0.12	9.1	0.01	2.8×10^{-6}	1.1×10^{-6}	-	1.1×10^{-6}	-
0519	5133	2.9×10^{-2}	-	240	70	7.34	51.3	3.77	-	-	0.22	4.4	0.01	7.7×10^{-6}	5.5×10^{-6}	-	2.7×10^{-7}	-
0520	5163	3.3×10^{-2}	-	168	85	7.73	50.8	3.93	-	-	0.07	0	0	3.8×10^{-6}	2.0×10^{-6}	-	4.8×10^{-7}	-
0521	5169	2.1×10^{-2}	-	240	70	7.87	50.6	3.98	-	-	0.08	11.9	0.01	2.8×10^{-6}	6.2×10^{-7}	-	-	-
0522	5171	2.1×10^{-2}	-	168	70	8.28	50.2	4.16	-	-	0.08	0	0	1.9×10^{-6}	1.1×10^{-6}	-	1.3×10^{-6}	-
0523	5148	3.7×10^{-2}	-	240	80	7.81	50.7	3.96	-	-	0.15	31.3	0.05	1.9×10^{-6}	8.0×10^{-7}	-	-	-
0524	5136	4.0×10^{-2}	-	240	260	8.35	51.1	4.27	-	-	0.10	0	0	9.5×10^{-7}	3.7×10^{-7}	-	-	-
0525	5140	3.5×10^{-2}	-	240	260	8.30	50.6	4.20	-	-	0.25	33.3	0.08	6.7×10^{-6}	2.7×10^{-6}	-	8.1×10^{-8}	-
0526	5166	3.0×10^{-2}	-	240	96	7.30	50.8	3.71	-	-	0.24	31.7	0.08	1.9×10^{-6}	6.2×10^{-7}	-	-	-
0527	burst at 6.0 ata																	
0528	5207	1.5×10^{-2}	-	168	80.4	7.77	51.0	3.96	-	-	0.09	21.2	0.02	3.8×10^{-6}	3.0×10^{-6}	-	1.8×10^{-6}	-
0529	5149	3.4×10^{-2}	-	168	260	8.12	50.7	4.12	-	-	0.10	27.0	0.03	5.3×10^{-6}	3.2×10^{-6}	-	3.9×10^{-7}	-
0530	5176	1.6×10^{-2}	-	240	70	7.72	50.7	3.91	-	-	0.05	0	0	9.5×10^{-7}	2.8×10^{-7}	-	-	-
0531	5132	3.2×10^{-2}	-	168	81.5	8.34	51.0	4.25	-	-	0.08	15.5	-	7.6×10^{-6}	2.5×10^{-6}	-	8.4×10^{-7}	-
0532	5126	3.8×10^{-2}	-	168	70	8.40	50.0	4.20	-	-	0.12	10.0	0.01	1.9×10^{-6}	5.7×10^{-7}	-	-	-
0533	5149	2.5×10^{-2}	-	168	134	7.82	50.4	3.94	-	-	0.12	23.1	0.03	1.9×10^{-6}	6.0×10^{-7}	-	-	-
0534	5136	2.0×10^{-2}	-	168	70	8.58	50.6	4.34	-	-	0.06	0	0	1.9×10^{-6}	3.7×10^{-7}	-	-	-
0535	5182	2.2×10^{-2}	-	240	260	7.75	51.0	3.95	1.4×10^{-5}	-	0.03	0	0	3.8×10^{-6}	1.9×10^{-6}	-	1.2×10^{-6}	-
0536	5124	3.4×10^{-2}	-	216	96	8.20	51.0	4.18	6.9×10^{-5}	-	0.14	3.95	0.0	4.8×10^{-6}	2.0×10^{-6}	-	1.5×10^{-7}	-
0537	5127	4.2×10^{-2}	-	168	81.5	8.26	51.0	4.21	-	-	0.17	23.9	0.04	2.8×10^{-6}	3.7×10^{-7}	-	-	-
0538	5164	2.5×10^{-2}	-	240	200	7.17	51.6	3.70	-	-	0.28	39.6	0.11	9.5×10^{-7}	8.3×10^{-7}	-	-	-
0539	5138	3.9×10^{-2}	-	240	200	8.43	50.0	4.22	-	-	0.09	10.2	0.01	2.8×10^{-6}	1.1×10^{-6}	-	4.1×10^{-7}	-
0540	5146	2.9×10^{-2}	-	168	134	8.17	50.7	4.14	-	-	0.07	0	0	2.8×10^{-6}	1.7×10^{-6}	-	2.2×10^{-7}	-
0541	5151	4.2×10^{-2}	-	168	260	8.35	50.8	4.24	-	-	0.24	35.8	0.09	2.8×10^{-6}	4.7×10^{-7}	-	-	-
0542	5067	6.0×10^{-2}	-	168	134	8.58	50.7	4.35	-	-	1.16	45.8	0.53	$< 10^{-6}$	4.2×10^{-7}	-	-	-

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Table 3.1.11

Fuel Rods (9th Delivery)

No.	Original			First Impregnation							Second Impregnation						3rd Impr.	
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Carbon Yield %	Sec. Carb. Cont. %	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin-Uptake %	Carbon Yield %	Sec. Carb. Cont. %	Permeability, $cm^2\ sec^{-1}$ (Press. Dec.)	(Vac. Dec.)	Remarks	Permeab. $cm^2\ sec^{-1}$ (Vac. Dec.)	Remarks
Substandard																		
A	5123	2.9×10^{-2}	-	144	82.5	7.80	51.0	3.98	-	-	0.09	0	0	2.8×10^{-6}	7.6×10^{-7}	-	-	-
B	5052	5.9×10^{-2}	-	144	80.5	8.52	51.6	4.40	-	-	0.32	31.9	0.07	2.8×10^{-6}	3.2×10^{-7}	-	-	-
C	5078	4.8×10^{-2}	-	144	80.5	8.41	51.8	4.36	-	-	0.13	15.7	0.02	3.8×10^{-6}	1.6×10^{-6}	-	3.4×10^{-6}	-
D	5092	6.5×10^{-2}	-	144	82.5	8.43	50.8	4.28	2.2×10^{-4}	-	0.37	36.9	0.15	1.9×10^{-6}	5.1×10^{-7}	-	-	-
E	5206	3.6×10^{-2}	-	144	82.5	7.09	51.2	3.63	-	-	0.11	15.5	0.02	9.5×10^{-7}	4.0×10^{-7}	-	-	-
F	5194	2.3×10^{-2}	-	144	80.5	7.51	52.0	3.91	-	-	0.06	0	0	1.9×10^{-6}	1.6×10^{-6}	-	5.5×10^{-6}	-
G	5232	1.7×10^{-2}	-	144	80.5	6.04	60.0	3.62	-	-	0.07	0	0	1.9×10^{-6}	7.1×10^{-7}	-	-	-
H	5093	4.3×10^{-2}	-	144	82.0	8.21	51.2	4.20	-	-	0.12	0	0	2.8×10^{-6}	1.6×10^{-6}	-	4.2×10^{-6}	-
I	5056	7.6×10^{-2}	-	144	82.0	9.82	43.1	4.23	-	-	0.80	39.6	0.32	1.9×10^{-6}	1.1×10^{-6}	-	2.0×10^{-6}	-
J	5118	4.8×10^{-2}	-	144	82.0	6.78	64.3	4.36	-	-	0.17	15.9	0.02	1.9×10^{-6}	1.6×10^{-6}	-	2.4×10^{-6}	-
K	open end badly chipped no impregn. possible																	
L	5090	8.7×10^{-2}	-	144	82.5	8.80	50.4	4.43	3.2×10^{-4}	-	0.66	41.8	0.28	3.6×10^{-6}	1.1×10^{-6}	-	2.8×10^{-6}	-
M	5136	4.1×10^{-2}	-	144	82.0	7.48	53.3	3.99	-	-	0.29	27.8	0.08	8.0×10^{-6}	8.6×10^{-6}	-	1.5×10^{-5}	-
N	5109	4.2×10^{-2}	-	144	82.0	7.86	52.5	4.12	-	-	0.19	35.8	0.06	1.9×10^{-6}	1.7×10^{-6}	-	3.0×10^{-6}	-

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Table 3.1.12

Long End Plugs (1st Delivery)

No.	Original			First Impregnation								Second Impregnation						
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Polym.-Content %	Carbon Yield %	Sec. Carb. Cont. %	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin-Uptake %	Polym.-Content %	Carbon Yield %	Sec. Carb. Cont. %	Permeability, cm^2sec^{-1} (Press. Dec.)	(Vac. Dec.)	Remarks
0001	1181.0	6.1×10^{-2}	-	168	108	8.72	8.02	51.0	4.45	1.4×10^{-4}	-	0.08	0	0	-	1.7×10^{-5}	-	-
0002	1199.6	2.8×10^{-2}	-	168	170	7.82	7.50	-	-	-	3	-	-	-	-	-	-	-
0003	1179.9	5.4×10^{-2}	-	168	250	8.40	7.85	-	-	-	2	-	-	-	-	-	-	-
0004	1174.6	7.6×10^{-2}	-	141	240	8.78	8.04	51.7	4.54	6.0×10^{-4}	-	0.80	0.68	25.25	0.20	$<10^{-5}$	-	-
0005	1177.2	8.2×10^{-2}	-	141	240	8.64	7.90	51.9	4.48	7.9×10^{-4}	-	1.00	0.76	35.7	0.36	$<10^{-5}$	-	-
0006	1178.6	6.1×10^{-2}	-	168	108	8.48	7.86	-	-	-	2	-	-	-	-	-	-	-
0007	1178.4	6.3×10^{-2}	-	168	108	8.58	7.88	51.1	4.38	1.2×10^{-4}	-	0.08	0.008	0	0	4.8×10^{-5}	-	-
0008	1150.9	14.4×10^{-2}	-	351	103	9.9	9.10	52.0	5.14	6.7×10^{-4}	-	1.44	1.40	34.3	0.48	$<10^{-5}$	-	1
0009	1148.6	14.4×10^{-2}	-	351	103	10.2	9.39	51.7	5.27	8.4×10^{-4}	-	1.46	1.20	32.4	0.47	1.3×10^{-5}	-	-
0010	1174.3	5.3×10^{-2}	-	168	108	8.70	7.99	50.1	4.36	8.8×10^{-5}	-	0.12	0.02	0	0	$<10^{-5}$	-	-
0011	1144.3	14.0×10^{-2}	-	351	103	11.0	10.3	-	-	-	2	-	-	-	-	-	-	-
0012	1182.1	7.2×10^{-2}	-	141	240	8.47	7.90	51.6	4.38	4.3×10^{-4}	-	0.39	0.25	0	0	$<10^{-5}$	-	-
0013	1165.0	4.8×10^{-2}	-	168	108	8.82	8.16	51.1	4.51	7.6×10^{-5}	-	0.07	-	0	0	1.2×10^{-5}	-	-
0014	1178.3	7.2×10^{-2}	-	141	240	8.48	7.91	50.9	4.31	2.4×10^{-4}	-	0.25	0.12	0	0	1.9×10^{-5}	-	-
0015	1180.7	9.8×10^{-2}	-	168	108	8.47	7.68	52.0	4.40	2.3×10^{-4}	-	0.09	0.008	0	0	8.4×10^{-5}	-	-
0016	1164.1	9.6×10^{-2}	-	168	250	8.61	-	-	-	-	2	-	-	-	-	-	-	-
0017	1179.5	4.5×10^{-2}	-	168	250	8.37	7.80	50.8	4.25	6.0×10^{-5}	-	0.15	0.02	0	0	$<10^{-5}$	-	-
0018	1157.8	13.4×10^{-2}	-	351	103	10.6	9.80	51.2	5.43	5.7×10^{-4}	-	0.93	0.69	18.4	0.17	$<10^{-5}$	-	-
0019	1164.3	11.7×10^{-2}	-	141	91	9.40	8.78	51.6	4.85	3.9×10^{-4}	-	0.69	0.47	14.3	0.10	8.0×10^{-6}	-	-
0020	1166.9	7.8×10^{-2}	-	141	240	9.03	8.36	51.4	4.64	4.6×10^{-4}	-	0.61	0.47	21.6	0.13	$<10^{-5}$	-	-
0021	1173.0	9.9×10^{-2}	-	168	170	8.54	7.88	51.4	4.39	5.8×10^{-4}	-	0.66	0.49	19.7	0.13	$<10^{-5}$	-	1
0022	1177.7	5.8×10^{-2}	-	168	170	8.65	8.05	-	-	-	2	-	-	-	-	-	-	-
0023	1175.2	8.5×10^{-2}	-	141	240	8.54	7.85	51.9	4.43	8.5×10^{-4}	-	1.07	0.79	32.8	0.35	5.9×10^{-6}	-	-
0024	1195.2	2.5×10^{-2}	-	168	250	7.89	7.47	-	-	-	3	-	-	-	-	-	-	-
0025	1180.9	7.9×10^{-2}	-	141	240	8.67	8.08	51.6	4.47	5.4×10^{-4}	-	0.88	0.74	26.8	0.24	$<10^{-5}$	-	-
0026	1171.0	5.4×10^{-2}	-	168	250	8.70	8.10	51.0	4.44	1.6×10^{-4}	-	0.38	0.26	0	0	5.8×10^{-6}	-	-
0027	1157.0	12.5×10^{-2}	-	351	103	10.5	9.84	51.0	5.36	5.2×10^{-4}	-	1.31	0.98	13.7	0.18	-	-	1
0028	1180.6	6.0×10^{-2}	-	168	108	8.38	7.70	50.9	4.26	6.5×10^{-5}	-	0.06	0	0	0	$<10^{-5}$	-	-

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Table 3.1.12 (Continued)

Long End Plugs (1st Delivery)

No.	Original			First Impregnation								Second Impregnation						
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Polym.-Content %	Carbon Yield %	Sec. Carb. Cont. %	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin-Uptake %	Polym.-Content %	Carbon Yield %	Sec. Carb. Cont. %	Permeability, $cm^2\ sec^{-1}$ (Press. Dec.)	(Vac. Dec.)	Remarks
0029	1177.3	8.7×10^{-2}	-	141	91	9.03	8.45	51.7	4.67	1.9×10^{-4}	-	0.27	0.13	0	0	3.8×10^{-6}	-	-
0030	1180.5	6.9×10^{-2}	-	168	250	8.90	8.01	-	-	-	2	-	-	-	-	-	-	-
0031	1186.6	4.7×10^{-2}	-	168	108	9.39	7.90	50.7	4.76	5.8×10^{-5}	-	0.08	0.02	0	0	4.0×10^{-6}	-	-
0032	1168.9	6.7×10^{-2}	-	168	108	8.90	8.80	51.3	4.56	1.1×10^{-4}	-	0.16	0.02	0	0	2.3×10^{-6}	-	-
0033	1156.9	11.5×10^{-2}	-	141	91	9.72	8.90	52.0	5.06	4.2×10^{-4}	-	0.80	0.65	22.7	0.18	$<10^{-5}$	-	-
0034	1183.7	4.0×10^{-2}	-	168	250	8.30	7.75	51.1	4.24	5.5×10^{-5}	-	0.09	0	0	0	5.6×10^{-6}	-	-
0035	1186.5	5.3×10^{-2}	-	168	170	7.88	7.42	-	-	-	2	-	-	-	-	-	-	-
0036	1152.9	14.0×10^{-2}	-	351	103	10.9	9.75	50.5	5.51	7.3×10^{-4}	-	1.74	1.38	34.8	0.61	$<10^{-5}$	-	-
0037	1182.9	6.0×10^{-2}	-	168	250	8.37	7.89	51.2	4.28	1.6×10^{-4}	-	0.16	0.06	0	0	5.2×10^{-6}	-	-
0038	1175.9	3.8×10^{-2}	-	168	102	8.60	8.02	-	-	-	2	-	-	-	-	-	-	-
0039	1178.5	10.3×10^{-2}	-	141	91	8.80	8.22	50.8	4.47	3.9×10^{-4}	-	0.93	0.78	26.9	0.25	$<10^{-5}$	-	-
0040	1186.8	3.4×10^{-2}	-	168	102	8.17	7.68	50.0	4.09	4.0×10^{-5}	-	0.08	0.008	0	0	$<10^{-5}$	-	-
0041	1194.2	3.1×10^{-2}	-	168	102	8.02	7.54	49.9	4.00	2.0×10^{-5}	-	0.04	0	0	0	$<10^{-5}$	-	-
0042	1167.5	4.4×10^{-2}	-	168	108	8.82	8.16	-	-	-	2	-	-	-	-	-	-	-
0043	1164.5	8.7×10^{-2}	-	141	91	9.64	8.95	50.9	4.91	2.0×10^{-4}	-	0.21	0.04	0	0	1.2×10^{-5}	-	-
0044	1161.0	8.7×10^{-2}	-	141	91	8.83	7.60	51.1	4.51	1.3×10^{-4}	-	0.17	0.02	14.2	0.02	4.6×10^{-6}	-	-
0045	1167.6	7.6×10^{-2}	-	141	91	10.95	8.72	43.7	4.78	3.1×10^{-4}	-	0.57	0.42	11.4	0.06	$<10^{-5}$	-	-
0046	1182.6	5.4×10^{-2}	-	168	250	8.27	7.81	51.0	4.22	8.6×10^{-5}	-	0.12	0.04	0	0	$<10^{-5}$	-	-
0047	1182.6	4.5×10^{-2}	-	168	102	8.40	7.83	50.7	4.26	3.7×10^{-5}	-	0.05	0	0	0	$<10^{-5}$	-	-
0048	1191.5	3.0×10^{-2}	-	168	102	7.98	7.49	50.5	4.03	2.8×10^{-5}	-	0.08	0	0	0	$<10^{-5}$	-	-
0049	1171.9	3.6×10^{-2}	-	168	102	8.57	8.02	50.5	4.33	2.6×10^{-5}	-	0.02	0	0	0	$<10^{-5}$	-	-
0050	1172.0	3.0×10^{-2}	-	168	102	8.38	7.81	50.1	4.20	1.7×10^{-5}	-	0.02	0	0	0	$<10^{-5}$	-	-
0051	1166.9	8.2×10^{-2}	-	141	91	9.33	8.63	51.8	4.84	4.5×10^{-4}	-	0.88	0.73	11.1	0.1	$<10^{-5}$	-	-
0052	1164.2	5.0×10^{-2}	-	141	91	9.31	8.78	51.2	4.77	8.0×10^{-5}	-	0.38	0	0	0	$<10^{-5}$	-	-
0053	1170.5	10.3×10^{-2}	-	141	91	7.11	6.19	51.9	3.69	2.2×10^{-4}	-	0.41	0.08	0	0	$<10^{-5}$	-	-
0054	1154.5	11.7×10^{-2}	-	141	91	9.86	9.13	51.5	5.08	2.6×10^{-4}	-	0.73	0.52	18.2	0.13	$<10^{-5}$	-	-
0055	1183.0	6.1×10^{-2}	-	168	250	8.55	8.06	51.0	4.36	1.5×10^{-4}	-	0.23	0.15	0	0	$<10^{-5}$	-	-
0056	1147.9	14.4×10^{-2}	-	351	103	11.0	8.1	56.7	6.24	5.1×10^{-4}	-	1.49	1.05	25.4	0.38	$<10^{-5}$	-	-

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Table 3.1.12 (Continued)

Long End Plugs (1st Delivery)

Original				First Impregnation								Second Impregnation						
No.	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Polym.-Content %	Carbon Yield %	Sec. Carb. Cont. %	Permab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin-Uptake %	Polym.-Content %	Carbon Yield %	Sec. Carb. Cont. %	Permeability, $cm^2 sec^{-1}$ (Press.Dec)	(Vacuum.Dec.)	Remarks
0057	1197.9	2.7×10^{-2}	-	168	102	8.02	7.59	-	-	-	3	-	-	-	-	-	-	-
0058	1180.6	9.0×10^{-2}	-	141	91	8.58	7.95	51.5	4.42	4.5×10^{-4}	-	1.10	0.87	27.8	0.31	7.9×10^{-6}	-	-
0059	1167.5	3.9×10^{-2}	-	168	102	8.74	8.20	-	-	-	2	-	-	-	-	-	-	-
0060	1164.6	4.1×10^{-2}	-	168	102	8.80	8.28	-	-	-	2	-	-	-	-	-	-	-
0061	1172.3	9.9×10^{-2}	-	141	91	8.76	8.03	51.7	4.54	2.2×10^{-4}	-	1.31	1.10	33.1	0.43	-	-	-
0062	1157.9	13.1×10^{-2}	-	351	103	10.5	9.77	-	-	-	2	-	-	-	-	-		-
0063	1180.5	5.9×10^{-2}	-	168	170	8.48	7.91	-	-	-	2	-	-	-	-	-		-
0064	1166.8	9.6×10^{-2}	-	141	91	9.58	8.88	52.0	4.98	6.9×10^{-4}	-	1.44	1.30	-	-	-	-	3

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Table 3.1.13

Long End Plugs (2nd Delivery)

No.	Original			First Impregnation								Second Impregnation						3rd Impr.	
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Polym.-Content %	Carbon Yield %	Sec. Carb. Cont. %	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin-Uptake %	Carbon Yield %	Sec. Carb. Cont. %	Permeability, (Press.Dec.)	$cm^2 sec^{-1}$ (Vac.Dec.)	Remarks	Permeab. $cm^2 sec^{-1}$ (Vac.Dec.)	Remarks
0077	1182	2.8×10^{-2}	-	240	72	6.97	-	49.6	3.46	-	-	0.14	0	0	$<10^{-6}$	-	-	4.7×10^{-7}	-
0078	1177	2.9×10^{-2}	-	240	72	6.86	-	50.0	3.43	-	-	0.098	43.1	0.04	1.1×10^{-5}	-	-	-	-
0079	1171	3.4×10^{-2}	-	216	131	8.26	-	-	-	-	3	-	-	-	-	-	-	-	-
0080	1166	4.2×10^{-2}	-	216	131	8.63	7.41	50.5	4.36	8.3×10^{-5}	-	0.12	0	0	-	-	-	1.3×10^{-5}	-
0081	1178	3.0×10^{-2}	-	168	75	7.28	6.24	51.1	3.72	2.1×10^{-5}	-	5.09	-	0.48	$<10^{-6}$	1.8×10^{-7}	-	-	-
0082	1175	2.8×10^{-2}	-	288	152	8.05	-	52.2	4.20	-	-	0.20	0	0	6.2×10^{-6}	9.4×10^{-7}	-	2.1×10^{-7}	-
0083	1163	4.6×10^{-2}	-	192	140	8.08	-	51.1	4.13	-	-	0.16	15.8	0.03	1.6×10^{-6}	7.3×10^{-7}	-	3.1×10^{-6}	-
0084	1170	4.4×10^{-2}	-	216	156	8.63	-	49.7	4.29	-	-	0.45	40.0	0.18	6.0×10^{-5}	-	-	3.3×10^{-7}	-
0085	1168	2.8×10^{-2}	-	216	131	8.93	7.72	56.4	5.04	6.0×10^{-5}	-	0.12	0	0	-	-	-	9.4×10^{-8}	-
0086	1179	2.8×10^{-2}	-	185	185	7.62	6.82	-	-	-	3	-	-	-	-	-	-	-	-
0087	1171	2.8×10^{-2}	-	216	131	8.08	6.77	51.5	3.49	5.4×10^{-5}	-	0.13	0	0	-	-	-	2.5×10^{-6}	-
0088	1174	2.8×10^{-2}	-	240	72	7.34	-	50.0	3.67	7.2×10^{-5}	-	0.08	50.0	0.04	1.1×10^{-5}	-	-	-	-
0089	1176	3.4×10^{-2}	-	216	156	6.85	-	50.2	3.44	-	-	0.17	4.76	0.01	8.0×10^{-6}	4.0×10^{-6}	-	3.5×10^{-7}	-
0090	1178	2.8×10^{-2}	-	185	185	7.60	6.76	50.1	3.82	1.8×10^{-5}	-	0.15	16.7	0.02	-	-	-	1.4×10^{-7}	-
0091	1174	4.3×10^{-2}	-	216	156	8.22	-	50.7	4.17	2.9×10^{-4}	-	0.21	23.1	0.05	6.0×10^{-6}	1.4×10^{-6}	-	3.8×10^{-7}	-
0092	1164	4.2×10^{-2}	-	248	72	8.65	-	49.5	4.28	-	-	0.45	30.9	0.13	2.7×10^{-6}	1.8×10^{-7}	-	-	-
0094	1179	3.1×10^{-2}	-	216	156	7.47	-	48.7	3.64	-	-	0.14	23.6	0.03	1.5×10^{-5}	-	-	3.1×10^{-7}	-
0095	1180	2.6×10^{-2}	-	185	185	7.79	7.13	50.2	3.91	1.9×10^{-5}	-	0.10	0	0	-	-	-	8.4×10^{-7}	-
0096	1156	6.6×10^{-2}	-	216	156	8.49	-	49.6	4.21	-	-	0.51	44.3	0.22	3.1×10^{-6}	2.7×10^{-7}	-	-	-
0097	1173	3.2×10^{-2}	-	240	72	8.23	-	57.0	4.69	-	-	0.41	0	0	6.2×10^{-6}	2.5×10^{-6}	-	2.3×10^{-6}	-
0098	1163	5.1×10^{-2}	-	216	156	8.81	-	49.3	4.34	-	-	0.98	48.8	0.48	7.8×10^{-6}	1.7×10^{-6}	-	1.6×10^{-6}	-
0099	1179	2.8×10^{-2}	-	185	185	8.44	6.61	45.6	3.85	4.3×10^{-5}	-	0.13	-	0	-	-	-	3.6×10^{-7}	-
0100	1161	4.9×10^{-2}	-	240	72	8.67	-	55.3	4.79	-	-	0	0	0	1.5×10^{-5}	-	-	5.1×10^{-6}	-
0101	1171	2.9×10^{-2}	-	216	131	7.29	7.05	57.3	4.18	4.4×10^{-5}	-	0.11	0	0	-	-	-	2.6×10^{-6}	-
0102	1166	-	=	192	180	6.15	-	55.5	3.41	2.1×10^{-4}	-	0.17	0	0	1.3×10^{-5}	-	-	1.4×10^{-7}	-
0103	1161	5.9×10^{-2}	-	185	185	8.97	8.46	50.0	4.48	1.8×10^{-4}	-	0.16	5.0	0.01	-	-	-	4.9×10^{-7}	-
0104	1170	3.3×10^{-2}	-	216	156	8.00	-	50.1	4.01	-	-	0.18	9.09	0.02	1.9×10^{-5}	-	-	6.3×10^{-7}	-
0105	1182	2.3×10^{-2}	-	248	72	7.93	-	61.7	4.90	-	-	0.19	0	0	7.8×10^{-6}	2.9×10^{-6}	-	1.2×10^{-7}	-

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Table 3.1.13 (Continued)

Long End Plugs (2nd Delivery)

No.	Original			First Impregnation								Second Impregnation						3rd Impr.	
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Polym.-Content %	Carbon Yield %	Sec. Carb. Cont. %	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin-Uptake %	Carbon Yield %	Sec. Carb. Cont. %	Permeability, (Press.Dec.)	$cm^2 sec^{-1}$ (Vac.Dec.)	Remarks	Permeab. $cm^2 sec^{-1}$ (Vac.Dec.)	Remarks
0106	1181	2.9×10^{-2}	-	240	72	7.98	-	49.3	3.94	-	-	0.20	24.0	0.05	9.2×10^{-6}	1.7×10^{-6}	-	9.2×10^{-6}	-
0107	1172	4.0×10^{-2}	-	185	185	9.01	8.49	49.7	4.48	9.1×10^{-5}	-	0.02	-	0	-	-	-	4.0×10^{-7}	-
0108	1165	5.2×10^{-2}	-	240	72	8.36	-	61.8	5.18	-	-	0.66	0	-	1.3×10^{-5}	-	-	1.9×10^{-6}	-
0109	1162	4.6×10^{-2}	-	-	-	8.74	8.21	-	-	-	3	-	-	-	-	-	-	-	-
0110	1165	3.8×10^{-2}	-	72	91.5	8.74	-	49.8	4.35	-	-	0.18	0	0	2.7×10^{-6}	4.1×10^{-7}	-	-	-
0111	1177	2.8×10^{-2}	-	248	72	8.21	-	50.0	4.11	-	-	0.29	27.8	0.08	$<10^{-6}$	1.1×10^{-7}	-	-	-
0112	1173	2.4×10^{-2}	-	168	86	7.67	-	50.3	3.86	-	-	0.12	0	0	7.3×10^{-6}	5.8×10^{-6}	-	1.3×10^{-5}	-
0113	1177	2.8×10^{-2}	-	72	91.5	9.25	-	44.5	4.12	-	-	0.29	34.3	0.09	2.5×10^{-6}	2.2×10^{-7}	-	-	-
0114	1171	4.0×10^{-2}	-	72	91.5	9.16	-	47.2	4.32	-	-	0.30	18.8	0.06	4.2×10^{-5}	-	-	1.3×10^{-7}	-
0115	1152	4.3×10^{-2}	-	288	152	9.24	-	49.8	4.60	-	-	0.84	37.6	0.35	1.6×10^{-6}	6.0×10^{-7}	-	6.6×10^{-6}	-
0116	1176	2.8×10^{-2}	-	185	185	7.83	7.08	51.2	4,01	2.3×10^{-5}	-	0.08	0	0	-	-	-	2.7×10^{-7}	-
0117	1166	4.2×10^{-2}	-	248	72	8.70	-	49.8	4.33	-	-	0.48	32.8	0.15	2.7×10^{-6}	4.0×10^{-7}	-	-	-
0118	1180	2.8×10^{-2}	-	288	152	8.02	-	49.8	3.99	2.7×10^{-4}	-	0.20	32.0	0.07	3.1×10^{-6}	-	-	5.4×10^{-7}	-
0119	1172	4.0×10^{-2}	-	72	91.5	8.56	-	46.9	4.02	-	-	0.16	26.3	0.04	2.1×10^{-5}	-	-	7.8×10^{-8}	-
0120	1170	8.4×10^{-2}	-	182	140	7.88	-	50.8	4.00	-	-	0.17	23.8	0.04	5.3×10^{-6}	9.5×10^{-8}	-	-	-
0121	1175	2.8×10^{-2}	-	72	91.5	8.73	-	45.5	3.94	-	-	0.53	24.6	0.13	7.8×10^{-6}	5.6×10^{-7}	-	-	-
0122	1177	3.8×10^{-2}	-	288	152	8.40	-	50.5	4.21	-	-	0.34	35.7	0.12	7.8×10^{-6}	1.7×10^{-7}	-	-	-
0123	1164	4.0×10^{-2}	-	240	72	8.52	-	59.4	5.06	-	-	0.45	0	0	2.5×10^{-5}	-	-	1.3×10^{-5}	-
0124	1180	2.8×10^{-2}	-	248	72	8.21	-	48.8	4.01	3.3×10^{-4}	-	0.26	25.0	0.07	3.1×10^{-6}	1.2×10^{-7}	-	-	-
0125	1166	4.1×10^{-2}	-	165	75	8.56	8.00	49.6	-	-	3								
0126	1170	4.2×10^{-2}	-	240	72	8.74	-	49.5	4.35	-	-	0.29	28.6	0.07	7.0×10^{-5}	-	-	3.3×10^{-7}	-
0127	1171	3.3×10^{-2}	-	72	91.5	9.03	-	46.4	4.19	-	-	0.35	30.2	0.11	3.9×10^{-6}	8.9×10^{-7}	-	2.3×10^{-7}	-
0128	1174	2.8×10^{-2}	-	240	72	7.61	-	50.5	3.82	-	-	0.15	0	0	9.2×10^{-6}	3.9×10^{-7}	-	-	-
0129	1177	2.5×10^{-2}	-	185	185	7.55	6.49	50.0	3.78	3.4×10^{-5}	-	0.15	0	0	$<10^{-6}$	-	-	3.7×10^{-5}	-
0130	1173	2.9×10^{-2}	-	216	156	7.62	-	50.3	3.83	-	-	0.14	0	0	1.3×10^{-5}	-	-	-	-
0131	1147	6.3×10^{-2}	-	72	91.5	9.37	-	48.1	4.51	-	-	0.48	38.6	0.19	7.3×10^{-5}	-	-	1.6×10^{-7}	-
0132	1172	2.8×10^{-2}	-	72	86	7.04	-	51.0	3.59	-	-	0.08	0	0	5.4×10^{-6}	1.3×10^{-6}	-	2.0×10^{-6}	-
0133	1152	6.5×10^{-2}	-	528	178	9.07	7.95	52.0	4.72	4.2×10^{-4}	-	0.25	0	0	$<10^{-6}$	-	-	2.1×10^{-6}	-

T a b l e 3.1.13 (Continued)

Long End Plugs (2nd Delivery)

No.	Original			First Impregnation								Second Impregnation						3rd Impr.	
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Polym.-Content %	Carbon Yield %	Sec. Carb. Cont. %	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin-Uptake %	Carbon Yield %	Sec. Carb. Cont. %	Permeability, $cm^2\ sec^{-1}$ (Press.Dec.)	(Vac.Dec.)	Remarks	Permeab. $cm^2\ sec^{-1}$ (Vac.Dec.)	Remarks
0134	1168	3.8×10^{-2}	-	216	156	8.17	-	49.7	4.06	-	-	0.20	41.7	0.08	1.1×10^{-5}	-	-	1.6×10^{-7}	-
0135	1174	3.9×10^{-2}	-	216	216	8.10	-	49.8	4.07	3.5×10^{-4}	-	0.18	31.8	0.06	6.2×10^{-6}	1.8×10^{-6}	-	4.2×10^{-7}	-
0136	1163	5.5×10^{-2}	-	72	91.5	8.42	-	50.8	4.28	-	-	0.28	18.2	0.04	2.6×10^{-5}	-	-	3.1×10^{-7}	-
0137	1178	2.9×10^{-2}	-	288	152	8.31	-	50.0	4.16	-	-	0.18	27.3	0.05	3.1×10^{-6}	-	-	4.0×10^{-7}	-
0138	1161	4.6×10^{-2}	-	72	86	8.90	-	48.9	4.35	-	-	0.37	51.1	0.19	2.7×10^{-6}	1.3×10^{-7}	-	-	-
0139	1171	4.0×10^{-2}	-	165	75	8.57	7.96	50.2	4.30	3.7×10^{-5}	-	0.08	0	0	$< 10^{-6}$	-	-	4.8×10^{-7}	-
0140	1178	2.8×10^{-2}	-	522	178	7.80	6.53	50.3	3.83	3.9×10^{-5}	-	0.36	0	0	$< 10^{-6}$	-	-	5.8×10^{-8}	-
0141	1159	7.4×10^{-2}	-	216	156	8.83	-	49.4	4.36	-	-	0.89	49.1	0.49	3.1×10^{-6}	-	-	6.3×10^{-7}	-
0142	1174	2.9×10^{-2}	-	72	91.5	7.66	-	48.2	3.69	-	-	0.17	28.6	0.05	1.5×10^{-5}	-	-	2.8×10^{-7}	-
0143	1164	4.2×10^{-2}	-	288	152	9.16	-	59.4	5.44	-	-	0.42	0	0	9.1×10^{-6}	1.9×10^{-6}	-	1.9×10^{-6}	-
0144	1165	4.7×10^{-2}	-	216	156	7.42	-	49.5	3.67	-	-	0.18	50.0	0.09	3.1×10^{-6}	3.6×10^{-7}	-	-	-
0145	1171	3.3×10^{-2}	-	240	72	8.06	-	49.8	4.02	-	-	0.14	41.2	0.06	5.2×10^{-6}	9.5×10^{-7}	-	1.9×10^{-7}	-
0146	1175	3.5×10^{-2}	-	72	86	7.68	-	51.2	3.93	7.9×10^{-5}	-	0.12	0	0	4.0×10^{-6}	8.2×10^{-7}	-	7.6×10^{-7}	-
0147	1173	2.8×10^{-2}	-	248	72	7.70	-	41.6	3.21	-	-	0.54	35.4	0.18	2.4×10^{-5}	-	-	4.1×10^{-7}	-
0148	1177	3.4×10^{-2}	-	165	75	7.79	7.02	50.8	3.96	2.0×10^{-5}	-	0.12	0	0	$> 10^{-6}$	-	-	3.8×10^{-7}	-
0149	1163	4.4×10^{-2}	-	288	152	8.66	-	50.6	4.40	-	-	0.24	17.2	0.04	6.2×10^{-6}	8.7×10^{-7}	-	9.9×10^{-6}	-
0150	1167	3.7×10^{-2}	-	240	72	8.37	-	50.1	4.19	-	-	0.21	12.0	0.03	$< 10^{-6}$	1.0×10^{-7}	-	-	-
0151	1172	5.2×10^{-2}	-	72	91.5	8.02	-	48.7	3.91	-	-	0.10	16.7	0.02	4.7×10^{-6}	4.9×10^{-7}	-	-	-
0152	1172	2.6×10^{-2}	-	182	140	7.23	-	50.7	3.67	-	-	0.23	21.4	0.05	2.3×10^{-6}	1.4×10^{-7}	-	-	-
0153	1146	7.3×10^{-2}	-	165	75	9.19	8.57	-	-	-	3								
0154	1165	4.6×10^{-2}	-	182	140	8.19	-	51.3	4.20	-	-	0.13	12.5	0.02	4.7×10^{-6}	4.4×10^{-7}	-	-	-
0155	1173	4.0×10^{-2}	-	522	178	8.24	6.97	53.3	4.39	7.6×10^{-5}	-	0.12	0	0	$< 10^{-6}$	-	-	4.0×10^{-7}	-
0156	1163	3.0×10^{-2}	-	216	156	8.45	-	49.7	4.20	-	-	0.43	0	0	4.3×10^{-6}	9.8×10^{-7}	-	-	-
0157	1167	3.6×10^{-2}	-	522	178	8.07	6.54	51.6	4.16	1.4×10^{-4}	-	0.28	0	0	$< 10^{-6}$	-	-	2.7×10^{-6}	-
0158	1166	5.5×10^{-2}	-	72	86	8.52	-	49.6	4.23	-	-	0.22	44.4	0.10	3.7×10^{-5}	-	-	9.7×10^{-7}	-
0159	1178	2.8×10^{-2}	-	248	72	8.35	-	60.1	5.02	-	-	0.44	0	0	4.5×10^{-6}	1.3×10^{-6}	-	8.6×10^{-7}	-
0161	1151	6.3×10^{-2}	-	240	72	9.31	-	49.8	4.64	-	-	0.58	38.6	0.20	4.3×10^{-6}	1.6×10^{-6}	-	2.2×10^{-6}	-
0162	1165	4.4×10^{-2}	-	216	156	7.78	-	51.0	3.97	-	-	0.18	0	0	2.0×10^{-5}	-	-	1.9×10^{-7}	-
0163	1155	5.4×10^{-2}	-	522	178	8.90	7.70	53.6	4.77	1.3×10^{-4}	-	0.07	0	0	$< 10^{-6}$	-	-	1.7×10^{-6}	-

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Table 3.1.13 (Continued)

Long End Plugs (2nd Delivery)

No.	Original			First Impregnation								Second Impregnation						3rd Impr.	
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Polym.-Content %	Carbon Yield %	Sec. Carb. Cont. %	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin-Uptake %	Carbon Yield %	Sec. Carb. Cont. %	Permeability, $cm^2\ sec^{-1}$ (Press.Dec.)	(Vac.Dec.)	Remarks	Permeab. $cm^2\ sec^{-1}$ (Vac.Dec.)	Remarks
0165	1178	2.8×10^{-2}	-	522	178	8.33	7.29	52.1	4.34	4.8×10^{-5}	-	0.15	0	0	$< 10^{-6}$	-	-	4.0×10^{-6}	-
0166	1159	5.6×10^{-2}	-	522	178	8.94	7.49	51.8	4.63	3.6×10^{-4}	-	0.28	0	0	$< 10^{-6}$	-	-	7.7×10^{-6}	-
0167	1169	2.5×10^{-2}	-	185	185	7.45	6.46	51.2	3.81	3.6×10^{-5}	-	0.14	0	0	$< 10^{-6}$	-	-	2.1×10^{-7}	-
0168	1172	3.9×10^{-2}	-	192	74	7.89	-	50.3	3.97	-	-	0.16	25.0	0.04	6.2×10^{-6}	6.2×10^{-7}	-	7.4×10^{-7}	-
0169	1173	3.7×10^{-2}	-	248	72	7.86	-	41.1	3.23	4.6×10^{-4}	-	0.10	16.7	0.01	7.8×10^{-6}	4.5×10^{-7}	-	-	-
0170	1174	3.0×10^{-2}	-	216	156	7.57	-	50.1	3.79	-	-	0.18	18.2	0.03	7.7×10^{-6}	1.9×10^{-6}	-	6.2×10^{-7}	-
0171	1182	2.4×10^{-2}	-	216	156	6.47	-	50.3	3.25	-	-	0.12	20.0	0.02	4.7×10^{-6}	2.5×10^{-7}	-	-	-
0173	1154	5.9×10^{-2}	-	192	150	8.53	-	50.9	4.34	-	-	0.28	32.3	0.08	7.2×10^{-6}	-	-	-	-
0174	1158	5.9×10^{-2}	-	240	72	9.03	-	49.8	4.50	-	-	0.55	45.5	0.26	1.3×10^{-5}	-	-	4.8×10^{-6}	-
0175	1173	3.7×10^{-2}	-	216	131	8.53	7.55	51.6	4.40	4.4×10^{-5}	-	0.10	0	0	$< 10^{-6}$	-	-	4.2×10^{-7}	-
0176	1158	6.3×10^{-2}	-	240	72	8.93	-	49.6	4.43	-	-	0.80	46.4	0.38	1.0×10^{-5}	-	-	1.3×10^{-7}	-
0178	1171	3.3×10^{-2}	-	189	74	8.12	-	48.8	-	-	3	cracked during baking							
0179	1167	4.4×10^{-2}	-	72	86	8.34	-	50.8	4.24	-	-	0.20	28.0	0.06	2.7×10^{-6}	9.7×10^{-7}	-	1.9×10^{-7}	-
0180	1174	3.7×10^{-2}	-	288	152	8.67	-	48.7	4.22	-	-	0.31	23.7	0.07	2.1×10^{-6}	1.1×10^{-6}	-	1.4×10^{-7}	-
0181	1169	4.0×10^{-2}	-	189	74	8.09	-	49.9	4.04	-	-	0.17	0	0	4.9×10^{-6}	2.3×10^{-7}	-	-	-
0182	1172	4.6×10^{-2}	-	189	74	8.49	-	49.9	4.24	-	-	0.31	0	0	2.9×10^{-5}	-	-	-	3
0183	1171	4.4×10^{-2}	-	165	75	8.53	7.96	-	-	-	3	cracked during baking							
0184	1166	5.4×10^{-2}	-	522	178	8.08	7.64	48.3	3.90	2.5×10^{-4}	-	0.14	0	0	$< 10^{-6}$	-	-	9.1×10^{-7}	-
0185	1172	3.6×10^{-2}	-	216	156	7.71	-	49.2	3.79	6.0×10^{-5}	-	0.20	0	0	1.4×10^{-5}	-	-	2.6×10^{-7}	-
0186	1164	4.4×10^{-2}	-	248	72	8.87	-	53.0	4.70	-	-	0.48	0	0	1.6×10^{-6}	1.6×10^{-6}	-	5.7×10^{-7}	-
0187	1184	2.3×10^{-2}	-	182	140	6.97	-	49.9	3.47	-	-	0.24	20.7	0.05	1.9×10^{-6}	1.9×10^{-7}	-	-	-
0188	1176	3.2×10^{-2}	-	189	74	7.87	-	49.8	3.92	-	-	0.09	9.1	0.01	$< 10^{-6}$	2.4×10^{-7}	-	-	-
0189	1176	2.4×10^{-2}	-	189	74	7.72	-	50.2	3.88	4.6×10^{-5}	-	0.07	22.2	0.01	1.1×10^{-5}	-	-	1.3×10^{-7}	-
0190	1163	5.9×10^{-2}	-	72	86	8.92	-	50.1	4.47	-	-	0.36	31.8	0.11	9.4×10^{-6}	4.9×10^{-7}	-	-	-
0191	1169	4.1×10^{-2}	-	522	178	8.83	-	-	-	-	3								
0192	1174	3.7×10^{-2}	-	288	152	8.57	-	50.1	4.30	-	-	0.20	12.0	0.03	5.4×10^{-7}	8.8×10^{-8}	-	-	-
0193	1172	3.8×10^{-2}	-	240	72	7.80	-	52.3	4.08	-	-	0.16	10.6	0.02	7.8×10^{-6}	-	-	5.4×10^{-7}	-
0194	1173	2.3×10^{-2}	-	182	140	7.50	-	51.0	3.82	-	-	0.14	0	0	$< 10^{-6}$	4.9×10^{-6}	-	-	-

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Table 3.1.13 (Continued)

Long End Plugs (2nd Delivery)

No.	Original			First Impregnation								Second Impregnation						3rd Impr.	
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Polym.-Content %	Carbon Yield %	Sec. Carb. Cont. %	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin-Uptake %	Carbon Yield %	Sec. Carb. Cont. %	Permeability, $cm^2\ sec^{-1}$ (Press.Dec.)	(Vac. Dec.)	Remarks	Permeab. $cm^2\ sec^{-1}$ (Vac.Dec.)	Remarks
0195	1162	5.2×10^{-2}	-	189	74	7.78	-	48.4	3.77	-	-	1.04	48.0	0.49	8.7×10^{-5}	-	-	5.5×10^{-6}	-
0196	1179	2.5×10^{-2}	-	248	72	8.39	-	49.6	4.16	-	-	0.13	0	0	3.1×10^{-6}	4.9×10^{-7}	-	-	-
0197	1193	2.9×10^{-3}	-	182	140	6.81	-	52.0	3.54	-	-	0.32	0	0	4.7×10^{-6}	4.3×10^{-8}	-	-	-
0198	1168	3.3×10^{-2}	-	182	140	8.19	-	51.8	4.24	1.3×10^{-4}	-	0.14	0	0	1.0×10^{-6}	1.1×10^{-7}	-	-	-
0199	1178	2.4×10^{-2}	-	240	72	7.95	-	49.7	3.95	-	-	0.13	43.8	0.06	$< 10^{-6}$	7.5×10^{-8}	-	-	-
0200	1166	5.5×10^{-2}	-	185	185	8.70	8.21	-	-	-	3								
0201	1161	3.5×10^{-2}	-	240	72	8.65	-	49.6	4.29	-	-	0.28	35.5	0.09	5.9×10^{-6}	5.9×10^{-7}	-	2.6×10^{-7}	-
0202	1175	3.4×10^{-2}	-	240	72	8.18	-	49.9	4.08	-	-	0.28	14.7	0.04	1.0×10^{-6}	1.9×10^{-7}	-	-	-
0203	1157	5.9×10^{-2}	-	165	75	8.97	8.33	-	-	-	3								
0204	1180	2.5×10^{-2}	-	182	140	7.13	-	51.0	3.63	-	-	0.12	0	0	$< 10^{-6}$	9.6×10^{-8}	-	-	-
0206	1160	5.7×10^{-2}	-	216	156	8.68	-	49.6	4.30	-	-	0.41	50.0	0.21	7.8×10^{-6}	6.5×10^{-7}	-	1.6×10^{-7}	-
0207	1183	2.8×10^{-2}	-	72	86	6.91	-	50.0	3.45	-	-	0.10	0	0	$< 10^{-6}$	1.3×10^{-7}	-	-	-
0208	1158	5.9×10^{-2}	-	72	86	9.12	-	49.8	4.54	-	-	0.21	19.2	0.04	$< 10^{-6}$	6.7×10^{-7}	-	8.7×10^{-7}	-
0209	1147	8.0×10^{-2}	-	216	156	8.93	-	50.3	4.44	-	-	0.43	48.1	0.21	1.6×10^{-5}	-	-	1.4×10^{-6}	-
0210	1170	4.0×10^{-2}	-	216	131	8.82	3.34	51.3	4.53	1.1×10^{-4}	-	0.13	0	0	$< 10^{-6}$	-	-	1.4×10^{-7}	-
0211	1180	2.4×10^{-2}	-	189	74	7.29	-	50.0	3.65	-	-	1.00	10.0	0.10	3.9×10^{-6}	7.1×10^{-7}	-	1.3×10^{-7}	-
0212	1183	2.5×10^{-2}	-	240	72	7.90	-	49.2	3.89	-	-	0.18	18.2	0.04	7.8×10^{-6}	2.1×10^{-7}	-	-	-
0213	1160	4.9×10^{-2}	-	165	75	9.00	8.39	50.2	4.52	3.9×10^{-5}	-	0.04	0	0	$< 10^{-6}$	-	-	5.7×10^{-7}	-
0214	1176	2.8×10^{-2}	-	288	152	8.01	-	50.2	4.02	-	-	0.12	0	0	4.7×10^{-6}	1.9×10^{-7}	-	-	-
0215	1178	2.8×10^{-2}	-	216	131	7.94	6.65	51.0	4.05	5.3×10^{-5}	-	0.04	0	0	$< 10^{-6}$	-	-	1.7×10^{-5}	-
0216	1175	3.5×10^{-2}	-	189	74	8.06	-	49.7	4.01	8.0×10^{-5}	-	0.08	30.0	0.02	2.6×10^{-6}	7.8×10^{-7}	-	5.4×10^{-7}	-
0217	1178	3.1×10^{-2}	-	216	131	7.99	6.74	51.3	4.10	5.9×10^{-5}	-	0.15	0	0	$< 10^{-6}$	-	-	7.8×10^{-8}	-
0218	1156	4.4×10^{-2}	-	216	131	8.94	7.93	-	-	-	3								
0219	1154	4.2×10^{-2}	-	165	75	9.17	8.54	-	-	-	3								
0220	1169	3.4×10^{-2}	-	189	74	8.55	-	50.2	4.29	-	-	0.28	38.2	0.10	3.1×10^{-6}	6.8×10^{-7}	-	1.3×10^{-7}	-
0221	1163	4.2×10^{-2}	-	522	178	8.73	7.10	53.4	4.66	2.4×10^{-4}	-	0.22	0	0	$< 10^{-6}$	-	-	4.1×10^{-7}	-
0222	1179	2.8×10^{-2}	-	72	86	7.96	-	50.2	4.00	-	-	0.08	40.0	0.03	6.2×10^{-6}	4.0×10^{-7}	-	-	-

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Table 3.1.14

Long End Plugs (5^{th} Delivery)

No.	Original			First Impregnation							Second Impregnation						3rd Impr.	
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Carbon Yield %	Sec-Carb. Cont. %	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin-Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeability, $cm^2\ sec^{-1}$ (Press.Dec.)	(Vac. Dec.)	Remarks	Permeab. $cm^2\ sec^{-1}$ (Vac. Dec.)	Remarks
0093	1162.5	4.5×10^{-2}	-	314	130	8.55	50.4	4.31	-	-	0.46	26.8	0.12	1.4×10^{-5}	-	-	4.5×10^{-7}	-
0281	1163.3	3.9×10^{-2}	-	401	108	9.06	44.8	4.06	-	-	0.44	37.8	0.17	$< 10^{-6}$	1.7×10^{-6}	-	3.5×10^{-5}	-
0282	1151.9	5.4×10^{-2}	-	402	111	9.42	50.2	4.73	-	-	0.19	52.2	0.09	8.5×10^{-6}	1.7×10^{-6}	-	6.3×10^{-5}	-
0283	1168.0	2.8×10^{-2}	-	358	130	7.64	49.9	3.81	-	-	0.28	26.5	0.07	6.2×10^{-6}	1.4×10^{-6}	-	9.3×10^{-7}	-
0284	1170.7	3.7×10^{-2}	-	361	109	8.57	49.5	4.24	7.8×10^{-5}	-	0.11	-	-	4.0×10^{-6}	2.3×10^{-6}	-	6.1×10^{-7}	-
0285	1157.8	burst at 7.7 ata																
0286	1177.4	2.3×10^{-2}	-	401	108	7.72	49.8	3.84	-	-	0.33	32.5	0.11	$< 10^{-6}$	1.2×10^{-6}	-	3.3×10^{-5}	-
0287	1169.1	3.3×10^{-2}	-	361	109	8.54	50.0	4.27	-	-	0.18	45.4	0.08	6.2×10^{-6}	1.1×10^{-6}	-	1.7×10^{-4}	-
0288	1155.0	5.0×10^{-2}	-	401	108	9.52	49.1	4.67	-	-	0.59	43.7	0.25	1.6×10^{-5}	-	-	1.2×10^{-6}	-
0289	1165.0	burst at 5.1 ata																
0290	1166.8	3.5×10^{-2}	-	358	130	8.11	49.9	4.05	3.2×10^{-4}	-	0.25	20.0	0.05	1.2×10^{-5}	-	-	8.0×10^{-7}	-
0291	1175.5	2.2×10^{-2}	-	401	108	6.34	49.5	3.14	-	-	0.26	32.2	0.08	$< 10^{-6}$	9.3×10^{-8}	-	-	-
0292	1162.9	3.8×10^{-2}	-	401	108	9.23	48.6	4.49	-	-	0.54	42.4	0.23	3.1×10^{-5}	-	-	2.1×10^{-6}	-
0293	1166.0	4.8×10^{-2}	-	167	71	8.98	50.3	4.52	-	-	0.68	33.7	0.23	4.7×10^{-6}	1.1×10^{-7}	-	-	-
0294	1151.0	5.5×10^{-2}	-	401	108	9.44	48.1	4.54	-	-	0.28	33.3	0.09	9.4×10^{-6}	2.9×10^{-6}	-	1.7×10^{-5}	-
0295	1162.0	4.4×10^{-2}	-	167	71	8.93	50.4	4.50	-	-	0.30	18.9	0.06	3.1×10^{-6}	4.8×10^{-8}	-	-	-
0296	1158.5	4.7×10^{-2}	-	361	109	8.87	51.1	4.53	-	-	0.41	42.0	0.17	$< 10^{-6}$	3.5×10^{-7}	-	-	-
0297	1166.9	burst at 6.8 ata																
0298	1176.7	crack on receipt																
0299	1173.8	2.6×10^{-2}	-	314	130	7.93	50.0	3.96	-	-	0.23	10.7	0.03	4.7×10^{-6}	1.6×10^{-6}	-	4.8×10^{-7}	-
0300	1165.5	3.4×10^{-2}	-	167	71	8.58	50.9	4.37	-	-	0.08	-	-	$< 10^{-6}$	7.9×10^{-7}	-	1.5×10^{-5}	-
0301	1158.3	5.2×10^{-2}	-	401	108	8.89	49.4	4.39	-	-	0.36	32.6	0.11	7.1×10^{-5}	-	-	1.6×10^{-7}	-
0302	1185.9	1.7×10^{-2}	-	314	130	6.94	50.7	3.52	6.7×10^{-5}	-	0.23	-	-	$< 10^{-6}$	crack during vacuum measurement			
0303	1168.0	3.1×10^{-2}	-	167	71	8.38	45.9	3.89	-	-	0.08	-	-	$< 10^{-6}$	2.5×10^{-7}	-	-	-
0304	1161.8	4.8×10^{-2}	-	314	130	8.75	50.2	4.39	-	-	0.21	19.2	0.04	7.8×10^{-6}	2.7×10^{-7}	-	-	-
0305	1168.1	3.9×10^{-2}	-	167	71	8.65	51.0	4.41	-	-	0.16	-	-	3.5×10^{-5}	-	-	2.2×10^{-7}	-
0306	1170.6	2.7×10^{-2}	-	314	103	7.31	50.9	3.72	-	-	0.31	18.4	0.06	5.5×10^{-6}	9.1×10^{-7}	-	6.8×10^{-8}	-
0307	1156.0	4.9×10^{-2}	-	358	130	8.75	54.9	4.80	-	-	0.28	29.4	0.08	5.4×10^{-5}	-	-	1.1×10^{-6}	-

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Table 3.1.14 (Continued)

Long End Plugs (5th Delivery)

No.	Original			First Impregnation							Second Impregnation						3rd Impr.	
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Carbon Yield %	Sec-Carb. Cont. %	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin-Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeability, $cm^2\ sec^{-1}$ (Press.Dec.)	(Vac. Dec.)	Remarks	Permeab. $cm^2\ sec^{-1}$ (Vac.Dec.)	Remarks
0308	1175.6	2.5×10^{-2}	-	361	109	8.43	50.9	4.29	-	-	0.22	40.7	0.09	4.3×10^{-6}	1.5×10^{-6}	-	9.9×10^{-5}	-
0309	1176.1	2.4×10^{-2}	-	358	130	7.27	49.2	3.58	-	-	0.32	28.2	0.09	9.9×10^{-6}	2.6×10^{-6}	-	2.9×10^{-6}	-
0310	1179.2	2.1×10^{-2}	-	314	130	8.29	32.7	2.71	2.3×10^{-5}	-	1.38	93.4	1.29	1.2×10^{-6}	2.8×10^{-7}	-	-	-
0311	1159.0	5.0×10^{-2}	-	314	130	7.96	50.4	4.01	-	-	0.38	8.7	0.03	1.6×10^{-6}	8.3×10^{-7}	-	1.7×10^{-7}	-
0312	1171.5	3.5×10^{-2}	-	401	108	8.25	49.8	4.11	-	-	0.39	39.6	0.15	5.9×10^{-6}	1.7×10^{-6}	-	1.4×10^{-6}	-
0313	1164.6	burst at 6.2 ata																
0314	1155.0	5.0×10^{-2}	-	167	71	9.45	50.4	4.76	-	-	0.45	18.2	0.08	6.2×10^{-6}	2.5×10^{-6}	-	1.4×10^{-5}	-
0315	1156.0	4.7×10^{-2}	-	358	130	8.43	50.1	4.22	-	-	0.42	15.7	0.07	4.7×10^{-6}	1.2×10^{-6}	-	1.2×10^{-6}	-
0316	1169.5	3.8×10^{-2}	-	314	130	7.89	50.9	4.02	-	-	0.23	3.6	0.01	$< 10^{-6}$	1.1×10^{-6}	-	2.0×10^{-7}	-
0317	1169.4	3.8×10^{-2}	-	402	114	8.37	49.3	4.13	-	-	0.19	39.1	0.07	$< 10^{-6}$	1.2×10^{-7}	-	-	-
0318	1156.8	4.3×10^{-2}	-	167	71	9.14	50.1	4.58	-	-	0.16	-	-	1.1×10^{-5}	-	-	8.2×10^{-8}	-
0319	1166.8	4.4×10^{-2}	-	401	108	8.71	49.3	4.29	4.0×10^{-4}	-	0.15	33.3	0.05	3.1×10^{-6}	1.0×10^{-6}	-	3.5×10^{-4}	-
0320	1167.8	3.6×10^{-2}	-	314	130	8.57	50.6	4.34	2.7×10^{-4}	-	0.14	47.1	0.07	7.5×10^{-6}	1.7×10^{-6}	-	7.7×10^{-5}	-
0321	1164.4	5.2×10^{-2}	-	361	109	8.42	50.5	4.25	-	-	0.33	27.5	0.09	1.3×10^{-5}	-	-	2.6×10^{-7}	-
0322	1166.5	3.6×10^{-2}	-	361	109	8.87	49.4	4.38	-	-	0.25	6.7	0.02	6.2×10^{-6}	6.4×10^{-7}	-	1.2×10^{-6}	-
0323	1156.7	5.0×10^{-2}	-	361	109	9.54	50.1	4.78	4.8×10^{-4}	-	0.36	38.6	0.14	6.6×10^{-6}	1.9×10^{-6}	-	8.1×10^{-5}	-
0324	1177.6	2.5×10^{-2}	-	361	109	7.89	50.6	3.99	-	-	0.47	29.3	0.14	6.2×10^{-6}	1.9×10^{-7}	-	-	-
0325	1186.3	1.7×10^{-2}	-	401	108	5.62	49.9	2.80	-	-	0.16	42.1	0.07	1.2×10^{-5}	-	-	4.6×10^{-5}	-
0326	1166.7	4.3×10^{-2}	-	361	109	8.42	49.8	4.19	-	-	0.12	53.3	0.06	$< 10^{-6}$	4.2×10^{-7}	-	-	-
0327	1156.5	5.1×10^{-2}	-	402	111	8.87	49.5	4.39	-	-	0.23	25.0	0.06	4.2×10^{-6}	7.9×10^{-7}	-	4.5×10^{-6}	-
0328	1157.1	5.1×10^{-2}	-	402	111	9.16	50.5	4.63	-	-	0.17	25.0	0.04	7.8×10^{-6}	2.2×10^{-6}	-	3.0×10^{-6}	-
0329	1171.7	3.0×10^{-2}	-	314	130	8.22	51.5	4.23	-	-	0.16	-	-	7.8×10^{-6}	3.2×10^{-6}	-	6.9×10^{-6}	-
0330	1168.4	3.6×10^{-2}	-	314	130	8.25	50.1	4.13	-	-	0.27	9.1	0.02	2.1×10^{-5}	-	-	1.9×10^{-6}	-
0331	1156.0	burst at 6.5 ata																
0332	1164.5	4.9×10^{-2}	-	314	130	8.84	50.6	4.47	-	-	0.16	-	-	1.2×10^{-6}	1.6×10^{-6}	-	2.5×10^{-5}	-
0333	1166.5	3.7×10^{-2}	-	167	71	8.57	48.2	4.13	-	-	0.40	55.1	0.22	1.6×10^{-6}	1.9×10^{-6}	-	2.9×10^{-7}	-
0334	1170.1	2.6×10^{-2}	-	361	109	7.49	50.5	3.78	-	-	0.49	23.7	0.12	$< 10^{-6}$	4.5×10^{-7}	-	-	-
0335	1183.5	1.7×10^{-2}	-	402	111	7.34	50.4	3.70	-	-	0.11	57.1	0.06	$< 10^{-6}$	4.7×10^{-7}	-	-	-

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Table 3.1.14 (Continued)

Long End Plugs (5th Delivery)

No.	Original			First Impregnation							Second Impregnation						3rd Impr.	
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Carbon Yield %	Sec-Carb. Cont. %	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin-Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeability, $cm^2\ sec^{-1}$ (Press.Dec.)	(Vac. Dec.)	Remarks	Permeab. $cm^2\ sec^{-1}$ (Vac.Dec.)	Remarks
0336	1157.5	4.7×10^{-2}	-	401	108	8.82	49.4	4.36	-	-	0.41	48.0	0.20	$<10^{-6}$	4.0×10^{-7}	-	-	-
0337	1184.9	1.6×10^{-2}	-	361	109	6.92	50.9	3.52	-	-	0.38	36.2	0.14	7.3×10^{-6}	1.1×10^{-6}	-	1.6×10^{-5}	-
0381	1171.8	3.3×10^{-2}	-	361	109	8.33	50.6	4.21	-	-	0.15	55.5	0.08	1.0×10^{-5}	-	-	2.9×10^{-7}	-
0382	1165.5	3.8×10^{-2}	-	314	130	8.46	51.1	4.32	-	-	0.27	-	-	6.2×10^{-6}	2.9×10^{-7}	-	-	-
0383	1170.4	3.3×10^{-2}	-	402	111	8.73	49.3	4.30	3.8×10^{-4}	-	0.20	25.0	0.05	5.2×10^{-6}	9.7×10^{-7}	-	-	-
0384	1165.9	5.3×10^{-2}	-	314	130	8.80	39.1	3.44	-	-	1.41	17.6	0.25	4.8×10^{-6}	-	-	3.7×10^{-7}	-
0385	1167.5	3.5×10^{-2}	-	401	108	8.65	49.6	4.29	-	-	0.39	39.6	0.15	3.2×10^{-5}	-	-	6.3×10^{-7}	-
0386	1169.4	3.3×10^{-2}	-	314	130	8.27	51.7	4.28	-	-	0.11	-	-	4.7×10^{-6}	4.6×10^{-7}	-	-	-
0387	1164.4	5.8×10^{-2}	-	314	130	8.39	51.3	4.30	-	-	0.22	0	-	1.1×10^{-5}	-	-	1.1×10^{-6}	-
0388	1173.3	3.2×10^{-2}	-	314	130	8.46	46.1	3.51	-	-	0.30	27.0	0.08	$<10^{-6}$	1.3×10^{-7}	-	-	-
0389	1167.8	5.6×10^{-2}	-	402	111	8.15	50.3	4.10	-	-	0.42	39.2	0.17	$<10^{-6}$	7.5×10^{-8}	-	-	-
0390	1160.2	4.8×10^{-2}	-	314	130	8.82	50.4	4.45	2.2×10^{-4}	-	0.15	-	-	$<10^{-6}$	5.5×10^{-7}	-	2.3×10^{-6}	-
0391	1166.5	5.6×10^{-2}	-	401	108	8.84	50.4	4.46	-	-	0.16	-	-	6.2×10^{-5}	-	-	6.7×10^{-7}	-
0392	1157.8	4.2×10^{-2}	-	314	130	8.37	50.7	4.24	-	-	0.09	-	-	7.8×10^{-6}	1.7×10^{-6}	-	1.4×10^{-7}	-
0393	1168.4	5.2×10^{-2}	-	401	108	8.33	50.8	4.23	-	-	0.37	13.3	0.05	6.7×10^{-6}	1.9×10^{-6}	-	1.9×10^{-7}	-
0394	1161.4	4.6×10^{-2}	-	314	130	9.09	50.1	4.55	2.2×10^{-4}	-	0.07	-	-	1.6×10^{-6}	1.4×10^{-6}	-	5.3×10^{-5}	-
0395	1162.4	3.7×10^{-2}	-	167	71	8.85	50.3	4.45	-	-	0.14	-	-	$<10^{-6}$	2.0×10^{-6}	-	2.9×10^{-5}	-
0396	1161.4	4.4×10^{-2}	-	401	108	8.68	50.2	4.36	-	-	0.36	-	-	4.9×10^{-5}	-	-	1.3×10^{-7}	-
0397	1166.3	5.8×10^{-2}	-	361	109	9.10	48.9	4.45	-	-	0.51	45.2	0.23	9.2×10^{-5}	-	-	8.4×10^{-7}	-
0398	1171.8	3.2×10^{-2}	-	361	109	8.50	50.7	4.31	-	-	0.38	36.9	0.14	1.6×10^{-6}	1.8×10^{-7}	-	-	-
0399	1166.9	3.7×10^{-2}	-	401	108	8.58	49.6	4.26	-	-	0.13	37.5	0.05	3.1×10^{-6}	2.3×10^{-6}	-	2.8×10^{-4}	-
0400	1164.4	5.3×10^{-2}	-	361	109	9.33	48.7	4.54	-	-	0.44	27.8	0.12	2.0×10^{-4}	-	-	8.5×10^{-7}	-
0401	1154.0	4.4×10^{-2}	-	401	108	8.81	49.8	4.39	6.6×10^{-4}	-	0.21	36.0	0.08	1.6×10^{-6}	7.3×10^{-7}	-	2.9×10^{-6}	-
0402	1163.4	3.8×10^{-2}	-	314	130	8.16	50.6	4.13	-	-	0.24	6.9	0.02	1.3×10^{-5}	-	-	9.2×10^{-8}	-
0403	1171.0	3.5×10^{-2}	-	401	108	7.67	49.2	3.77	-	-	0.46	37.5	0.17	4.7×10^{-5}	-	-	1.4×10^{-7}	-
0404	1166.2	3.3×10^{-2}	-	314	130	8.61	49.3	4.24	-	-	0.21	12.0	0.03	6.2×10^{-6}	5.6×10^{-7}	-	3.6×10^{-7}	-
0405	1168.7	3.7×10^{-2}	-	314	130	7.99	50.8	4.06	-	-	0.21	8.0	0.02	7.3×10^{-6}	1.9×10^{-6}	-	1.7×10^{-7}	-

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Table 3.1.14 (Continued)

Long End Plugs (5th Delivery)

No.	Original			First Impregnation							Second Impregnation						3rd Impr.	
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Carbon Yield %	Sec. Carb. Cont. %	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin-Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeability, $cm^2\ sec^{-1}$ (Press.Dec.)	(Vac.Dec.)	Remarks	Permeab. $cm^2\ sec^{-1}$ (Vac.Dec.)	Remarks
0406	1173.0	3.5×10^{-2}	-	167	71	8.47	44.4	3.76	-	-	0.63	73.7	0.46	$<10^{-6}$	1.7×10^{-7}	-	-	-
0407	1161.4	3.8×10^{-2}	-	401	108	8.26	49.1	4.06	-	-	0.44	32.1	0.14	$<10^{-6}$	1.6×10^{-7}	-	-	-
0408	1168.4	3.4×10^{-2}	-	361	109	8.53	49.9	4.26	-	-	0.15	44.4	0.07	5.2×10^{-5}	-	-	4.1×10^{-7}	-

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Table 3.1.15

Long End Plugs (6^{th} Delivery)

No.	Original			First Impregnation							Second Impregnation						3rd Impr.	
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin-Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeability, $cm^2\ sec^{-1}$ (Press.Dec.)	(Vac. Dec.)	Remarks	Permeab. $cm^2\ sec^{-1}$ (Vac.Dec.)	Remarks
0409	1181.2	1.7×10^{-2}	-	130	118.2	6.49	45.0	2.92	-	-	0.15	66.7	0.10	7.8×10^{-6}	5.2×10^{-7}	-	-	-
0410	1172.5	3.5×10^{-2}	-	159	92.5	6.47	51.1	3.25	-	-	0.12	0	-	2.1×10^{-5}	-	-	3.6×10^{-7}	-
0412	1147.5	6.5×10^{-2}	-	159	92.5	8.98	51.5	4.63	-	-	0.82	13.3	0.01	4.2×10^{-5}	-	-	3.1×10^{-6}	-
0413	1172.3	3.8×10^{-2}	-	159	92.5	7.06	51.6	3.64	-	-	0.13	0	-	9.4×10^{-6}	4.8×10^{-7}	-	-	-
0414	1178.2	2.6×10^{-2}	-	159	92.5	6.40	51.5	3.30	-	-	0.16	10.0	0.02	$< 10^{-6}$	6.7×10^{-7}	-	-	-
0415	1169.9	3.8×10^{-2}	-	159	92.5	4.10	-	-	-	-	0.20	24.0	0.05	3.1×10^{-6}	4.0×10^{-7}	-	-	-
0416	1174.9	2.6×10^{-2}	-	130	118.2	5.93	50.4	2.96	-	-	0.61	29.7	0.18	6.2×10^{-6}	1.1×10^{-6}	-	7.0×10^{-7}	-
0417	1173.5	3.5×10^{-2}	-	109	160	7.52	52.6	3.97	-	-	0.32	41.0	0.13	6.2×10^{-6}	3.0×10^{-7}	-	-	-
0418	1153.3	7.3×10^{-2}	-	134	135	6.52	49.5	3.24	-	-	0.33	0	-	3.5×10^{-4}	-	-	3.0×10^{-7}	-
0419	1178.6	2.0×10^{-2}	-	130	118.2	5.60	47.2	2.65	-	-	0.32	56.4	0.18	3.1×10^{-6}	6.8×10^{-7}	-	-	-
0420	1156.8	4.2×10^{-2}	-	197	94.2	6.92	47.9	3.32	-	-	0.38	36.9	0.14	$< 10^{-6}$	3.9×10^{-7}	-	-	-
0421	1175.6	2.3×10^{-2}	-	159	92.5	6.30	51.1	3.22	-	-	0.13	0	-	3.2×10^{-5}	-	-	3.4×10^{-7}	-
0422	1155.6	7.2×10^{-2}	-	109	160	7.07	51.8	3.66	-	-	0.17	-	-	1.5×10^{-5}	-	-	2.0×10^{-5}	-
0423	1174.5	3.2×10^{-2}	-	159	92.5	6.01	51.5	3.10	-	-	0.14	17.6	0.02	3.1×10^{-6}	4.5×10^{-7}	-	-	-
0424	1178.2	2.3×10^{-2}	-	130	118.2	5.93	51.6	3.06	-	-	0.37	0	-	7.9×10^{-5}	-	-	1.0×10^{-6}	-
0425	1180.6	1.6×10^{-2}	-	159	92.5	6.15	51.2	3.16	-	-	0.20	40.0	0.08	$< 10^{-6}$	7.4×10^{-7}	-	-	-
0426	1168.4	3.6×10^{-2}	-	109	160	7.97	52.2	4.16	-	-	0.13	-	-	3.1×10^{-6}	7.8×10^{-7}	-	-	-
0427	1180.4	1.9×10^{-2}	-	134	135	5.06	50.2	2.54	-	-	0.19	0	-	5.8×10^{-5}	-	-	5.3×10^{-7}	-
0428	1161.1	crack on receipt																
0429	1183.6	2.1×10^{-2}	-	130	118.2	5.61	50.3	2.83	-	-	0.16	5.0	0.01	7.5×10^{-5}	-	-	3.1×10^{-7}	-
0431	1167.1	3.4×10^{-2}	-	109	160	7.67	46.6	3.58	-	-	0.10	0	-	6.1×10^{-5}	-	-	2.7×10^{-7}	-
0432	1152.1	8.1×10^{-2}	-	130	118.2	6.56	50.8	3.33	-	-	1.00	58.0	0.58	1.5×10^{-5}	-	-	4.3×10^{-7}	-
0433	1167.3	2.6×10^{-2}	-	159	92.5	7.35	55.7	4.09	-	-	0.16	20.0	0.03	2.7×10^{-5}	-	-	2.5×10^{-7}	-
0434	1164.2	3.3×10^{-2}	-	197	94.2	8.73	50.3	4.41	-	-	0.18	4.5	0.01	1.6×10^{-5}	-	-	3.8×10^{-7}	-
0435	1166.2	3.8×10^{-2}	-	197	94.2	8.93	49.0	4.38	-	-	0.20	29.2	0.05	7.8×10^{-5}	-	-	2.1×10^{-6}	-
0437	1170.7	3.4×10^{-2}	-	130	118.2	6.35	49.4	3.14	2.1×10^{-3}	-	2.08	23.9	0.50	7.9×10^{-5}	-	-	4.2×10^{-7}	-
0438	1166.6	3.9×10^{-2}	-	197	94.2	9.07	48.7	4.41	-	-	0.12	26.7	0.03	3.1×10^{-6}	2.6×10^{-7}	-	-	-
0439	1176.9	2.4×10^{-2}	-	197	94.2	6.64	50.1	3.34	-	-	0.08	20.0	0.02	1.1×10^{-5}	-	-	1.7×10^{-6}	-

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Table 3.1.15 (Continued)

Long End Plugs (6^{th} Delivery)

No.	Original			First Impregnation							Second Impregnation						3rd Impr.	
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin-Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeability, $cm^2\ sec^{-1}$ (Press.Dec.)	(Vac. Dec.)	Remarks	Permeab. $cm^2\ sec^{-1}$ (Vac.Dec.)	Remarks
0440	1126.0	2.5×10^{-2}	-	197	94.2	11.52	68.6	7.90	-	-	0.21	15.4	0.03	6.2×10^{-6}	7.2×10^{-7}	-	-	-
0441	1156.3	3.3×10^{-2}	-	159	92.5	6.27	51.0	3.19	-	-	0.32	39.5	0.13	3.1×10^{-6}	6.0×10^{-7}	-	-	-
0442	1166.0	3.9×10^{-2}	-	159	92.5	7.08	48.9	3.46	2.1×10^{-4}	-	0.16	0	-	3.1×10^{-6}	7.4×10^{-7}	-	-	-
0444	1174.3	2.2×10^{-2}	-	197	94.2	7.48	49.5	3.7	-	-	0.11	28.6	0.03	3.1×10^{-6}	5.1×10^{-7}	-	-	-
0445	1168.6	3.1×10^{-2}	-	159	92.5	7.19	48.6	3.50	-	-	0.16	0	-	$< 10^{-6}$	2.9×10^{-7}	-	-	-
0446	1171.0	3.4×10^{-2}	-	134	135	5.87	48.9	2.87	2.0×10^{-4}	-	0.22	11.1	0.02	2.6×10^{-5}	-	-	4.1×10^{-7}	-
0447	1153.4	6.8×10^{-2}	-	159	92.5	8.42	51.7	4.36	-	-	0.27	12.1	0.03	3.1×10^{-6}	2.6×10^{-7}	-	-	-
0448	1182.2	2.3×10^{-2}	-	159	92.5	6.41	48.6	3.13	-	-	0.44	13.0	0.06	6.5×10^{-5}	-	-	4.0×10^{-7}	-
0449	1173.4	3.1×10^{-2}	-	134	135	5.35	50.5	2.70	-	-	0.21	0	-	4.9×10^{-4}	-	-	2.4×10^{-6}	-
0450	1167.5	6.8×10^{-2}	-	130	118.2	7.82	40.0	3.13	-	-	0.75	0	-	1.1×10^{-5}	-	-	3.0×10^{-6}	-
0451	1154.9	4.8×10^{-2}	-	159	92.5	7.81	50.8	3.97	-	-	0.20	12.5	0.03	$< 10^{-6}$	-	-	2.2×10^{-7}	-
0452	1156.3	6.7×10^{-2}	-	197	94.2	9.71	45.1	4.39	-	-	0.29	28.6	0.08	1.1×10^{-4}	-	-	4.3×10^{-7}	-
0453	1168.9	3.4×10^{-2}	-	109	160	7.54	52.3	3.96	-	-	0.31	44.7	0.14	cracked during measurement				
0454	1164.4	burst at 7.8 ata																
0455	1172.9	2.9×10^{-2}	-	109	160	6.78	52.6	3.56	-	-	0.11	92.9	0.10	9.4×10^{-6}	2.4×10^{-7}	-	-	-
0456	1173.4	2.9×10^{-2}	-	130	118.2	6.74	51.7	3.48	-	-	0.38	0	-	6.2×10^{-5}	-	-	6.8×10^{-7}	-
0457	1173.0	3.4×10^{-2}	-	109	160	7.48	52.3	3.91	-	-	0.32	38.5	0.12	3.1×10^{-6}	1.3×10^{-7}	-	-	-
0458	1167.1	3.0×10^{-2}	-	130	118.2	5.90	50.8	2.99	-	-	0.56	41.8	0.23	3.1×10^{-6}	2.6×10^{-7}	-	-	-
0459	1161.1	4.0×10^{-2}	-	109	160	8.46	53.8	4.55	-	-	0.22	11.1	0.02	3.1×10^{-6}	8.3×10^{-7}	-	-	-
0460	1157.9	3.6×10^{-2}	-	159	92.5	8.26	49.7	4.11	-	-	0.23	0	-	4.7×10^{-5}	-	-	2.7×10^{-7}	-
0461	1178.9	2.4×10^{-2}	-	130	118.2	5.89	47.6	2.80	-	-	0.20	79.2	0.15	3.1×10^{-6}	2.1×10^{-6}	-	2.0×10^{-7}	-
0462	1170.6	3.0×10^{-2}	-	109	160	5.66	52.0	2.94	-	-	0.11	-	-	3.1×10^{-6}	1.8×10^{-7}	-	-	-
0463	1167.6	3.4×10^{-2}	-	197	94.2	7.26	47.6	3.46	-	-	0.23	35.7	0.08	6.2×10^{-6}	2.8×10^{-7}	-	-	-
0464	1173.1	3.3×10^{-2}	-	134	135	5.57	49.6	2.76	-	-	0.32	7.7	0.02	4.7×10^{-6}	1.2×10^{-6}	o	2.7×10^{-7}	-
0466	1183.4	1.6×10^{-2}	-	159	92.5	5.71	51.6	2.95	-	-	0.16	21.0	0.03	4.7×10^{-6}	3.0×10^{-7}	-	-	-
0467	1178.9	1.9×10^{-2}	-	159	92.5	5.94	47.0	2.80	-	-	0.13	0	-	7.8×10^{-6}	7.5×10^{-7}	-	-	-
0468	1158.4	4.3×10^{-2}	-	338	167.5	7.59	51.6	3.92	-	-	0.07	0	-	6.2×10^{-6}	1.2×10^{-6}	o	3.6×10^{-7}	-
0469	1176.0	2.7×10^{-2}	-	109	160	6.39	52.6	3.36	-	-	0.52	27.0	0.14	6.2×10^{-6}	9.3×10^{-7}	o	-	-

Table 3.1.15 (Continued)

Long End Plugs (6^{th} Delivery)

No.	Original			First Impregnation							Second Impregnation						3rd Impr.	
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin-Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeability, $cm^2\ sec^{-1}$ (Press.Dec.)	(Vac.Dec.)	Remarks	Permeab. $cm^2\ sec^{-1}$ (Vac.Dec.)	Remarks
0499	1170.4	3.5×10^{-2}	-	109	160	7.03	52.1	3.66	3.5×10^{-2}	-	0.27	0	-	4.1×10^{-5}	-	-	5.1×10^{-6}	-
0500	1174.6	3.5×10^{-2}	-	197	94.2	8.02	50.2	4.03	-	-	0.12	0	-	5.0×10^{-5}	-	-	3.8×10^{-7}	-
0501	1172.3	3.4×10^{-2}	-	197	94.2	7.10	47.7	3.38	-	-	0.21	0	-	4.4×10^{-5}	-	-	1.9×10^{-7}	-
0502	1172.4	3.2×10^{-2}	-	338	167,5	6.62	51.4	3.40	-	-	0.11	-	-	6.2×10^{-6}	7.4×10^{-7}	-	-	-
0503	1159.9	5.7×10^{-2}	-	197	94.2	9.10	49.3	4.49	-	-	0.27	42.4	0.11	3.1×10^{-6}	1.3×10^{-6}	-	9.3×10^{-7}	-
0504	1174.2	2.8×10^{-2}	-	197	94.2	6.57	47.8	3.14	-	-	0.29	40.0	0.12	9.4×10^{-6}	3.7×10^{-6}	-	1.8×10^{-7}	-
0505	1175.1	2.8×10^{-2}	-	134	135	5.19	49.2	2.55	1.8×10^{-4}	-	0.81	37.7	0.30	3.1×10^{-6}	7.4×10^{-7}	-	-	-
0506	1166.5	3.6×10^{-2}	-	197	94.2	7.29	47.2	3.44	-	-	0.33	42.5	0.14	3.1×10^{-6}	1.8×10^{-6}	-	1.2×10^{-7}	-
0507	1165.9	4.3×10^{-2}	-	197	94.2	8.98	48.5	4.35	-	-	0.11	23.1	0.03	2.9×10^{-5}	-	-	1.6×10^{-6}	-
0508	1166.6	4.1×10^{-2}	-	338	167.5	7.01	50.8	3.56	-	-	0.29	57.1	0.17	6.2×10^{-6}	5.2×10^{-7}	-	-	-
0509	1177.2	3.1×10^{-2}	-	338	167.5	6.70	51.1	3.42	-	-	0.16	80.0	0.13	3.1×10^{-6}	1.2×10^{-7}	-	-	-
0510	1170.9	3.6×10^{-2}	-	338	167.5	6.42	50.5	3.24	-	-	0.26	58.1	0.15	7.8×10^{-6}	9.7×10^{-7}	-	-	-
0511	1167.4	4.2×10^{-2}	-	134	135	5.38	49.4	2.66	3.9×10^{-4}	-	0.42	16.0	0.07	9.4×10^{-6}	2.5×10^{-6}	-	5.5×10^{-7}	-
0512	1167.4	4.8×10^{-2}	-	159	92.5	8.03	54.4	4.38	2.4×10^{-4}	-	0	0	-	7.8×10^{-6}	1.5×10^{-6}	-	1.9×10^{-6}	-
0513	1174.3	2.9×10^{-2}	-	197	94.2	7.22	48.1	3.48	-	3								
0514	1164.7	5.5×10^{-2}	-	338	167.5	7.00	50.4	3.53	-	-	0.30	69.4	0.21	6.2×10^{-6}	2.7×10^{-7}	-	-	-
0515	1164.3	4.7×10^{-2}	-	197	94.2	7.76	46.9	3.64	-	-	0.33	7.5	0.02	8.7×10^{-5}	-	-	1.1×10^{-7}	-
0516	1165.1	4.5×10^{-2}	-	159	92.5	7.54	48.2	3.64	-	-	0.13	31.2	0.04	3.1×10^{-6}	1.0×10^{-6}	-	1.4×10^{-7}	-
0517	1131.0	2.4×10^{-2}	-	159	92.5	10.19	72.0	7.35	-	-	0.20	25.0	0.05	1.1×10^{-5}	-	-	4.8×10^{-7}	-
0518	1178.3	2.5×10^{-2}	-	197	94.2	6.96	49.5	3.45	-	-	0.11	23.1	0.03	3.1×10^{-6}	2.6×10^{-7}	-	-	-
0519	1176.6	2.2×10^{-2}	-	339	170	6.07	51.1	3.10	-	-	0.57	47.8	0.27	3.1×10^{-6}	9.4×10^{-8}	-	-	-
0520	1178.1	2.5×10^{-2}	-	157	94.2	8.01	48.9	3.93	-	-	0.27	15.1	0.04	1.5×10^{-5}	-	-	3.9×10^{-7}	-
0521	1116.2	5.2×10^{-2}	-	134	135	6.28	49.5	3.11	-	-	0.60	6.9	0.04	2.0×10^{-4}	-	-	3.1×10^{-7}	-
0522	1173.5	3.6×10^{-2}	-	197	94.2	7.63	47.8	3.66	-	-	0.17	23.8	0.04	3.1×10^{-6}	3.6×10^{-7}	-	-	-
0523	1179.9	2.5×10^{-2}	-	338	167.5	5.84	50.9	2.97	9.3×10^{-5}	-	0.16	-	-	4.7×10^{-6}	2.3×10^{-7}	-	-	-
0524	1169.1	4.7×10^{-2}	-	197	94.2	7.44	46.3	3.45	-	-	0.17	38.1	0.06	1.5×10^{-5}	-	-	2.6×10^{-7}	-
0525	1181.0	2.2×10^{-2}	-	159	92.5	6.97	48.3	3.36	-	-	0.56	33.8	0.19	3.1×10^{-6}	2.8×10^{-7}	-	-	-
0526	1167.7	$4.5 \times 10-2$	-	138	167.5	7.14	50.7	3.62	-	-	0.13	-	-	4.7×10^{-6}	5.4×10^{-7}	-	-	-

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Table 3.1.15 (Continued)

Long End Plugs (6^{th} Delivery)

No.	Original			First Impregnation							Second Impregnation						3rd Impr.	
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin-Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeability, $cm^2\ sec^{-1}$ (Press.Dec.)	(Vac.Dec.)	Remarks	Permeab. $cm^2\ sec^{-1}$ (Vac.Dec.)	Remarks
0470	1153.3	7.5×10^{-2}	-	179	94.2	8.83	51.8	4.57	-	-	0.11	0	-	6.4×10^{-5}	-	-	8.5×10^{-8}	-
0471	1166.6	2.7×10^{-2}	-	109	160	6.38	52.0	3.32	-	-	0.80	2.1	0.02	4.7×10^{-5}	-	-	2.9×10^{-6}	-
0472	1167.9	3.6×10^{-2}	-	159	92.5	6.98	49.7	3.47	-	-	0.14	0	-	1.1×10^{-5}	-	-	5.1×10^{-7}	-
0473	1177.4	2.8×10^{-2}	-	197	94.2	8.95	50.0	4.47	3.9×10^{-4}	-	0.28	37.1	0.10	7.8×10^{-6}	4.2×10^{-7}	-	-	-
0474	1175.9	2.9×10^{-2}	-	197	94.2	7.20	49.6	3.57	2.0×10^{-4}	-	0.50	39.3	0.20	7.8×10^{-6}	2.4×10^{-6}	-	3.4×10^{-7}	-
0475	1169.9	3.4×10^{-2}	-	130	118.2	6.02	50.6	3.05	-	-	0.17	4.8	0.01	6.9×10^{-5}	-	-	6.4×10^{-7}	-
0476	1169.6	3.9×10^{-2}	-	159	92.5	7.39	48.6	3.57	-	-	0.17	4.8	0.01	6.9×10^{-5}	-	-	6.4×10^{-7}	-
0477	1177.4	2.4×10^{-2}	-	159	92.5	5.76	51.6	2.97	-	-	0.18	0	-	3.7×10^{-4}	-	-	7.1×10^{-7}	-
0478	1152.0	8.8×10^{-2}	-	130	118.2	7.93	51.3	4.07	-	-	0.59	15.5	0.09	1.0×10^{-6}	-	-	9.6×10^{-7}	-
0479	1170.9	3.5×10^{-2}	-	109	160	7.26	51.9	3.77	-	-	0.39	33.3	0.13	3.1×10^{-6}	3.1×10^{-7}	-	-	-
0480	1170.6	3.3×10^{-2}	-	109	160	5.76	52.1	3.00	-	-	0.77	30.1	0.23	3.1×10^{-6}	5.7×10^{-7}	-	-	-
0481	1165.6	crack on receipt																
0482	1183.1	2.2×10^{-2}	-	130	118.2	5.57	51.1	2.85	-	-	0.42	37.2	0.16	6.2×10^{-6}	1.0×10^{-6}	-	2.2×10^{-6}	-
0483	1157.3	6.3×10^{-2}	-	338	167.5	8.29	51.1	4.24	-	-	0.12	-	-	3.1×10^{-6}	6.7×10^{-7}	-	-	-
0484	1158.2	5.3×10^{-2}	-	130	118.2	6.53	52.0	3.39	-	-	1.38	20.6	0.28	3.1×10^{-6}	2.8×10^{-7}	-	-	-
0485	1164.6	3.1×10^{-2}	-	159	92.5	6.31	51.0	3.22	-	-	0.26	0	-	4.4×10^{-5}	-	-	2.7×10^{-7}	-
0486	1161.5	4.5×10^{-2}	-	130	118.2	5.90	51.4	3.03	-	-	1.10	15.9	0.18	7.0×10^{-5}	-	-	3.7×10^{-7}	-
0488	1161.2	4.0×10^{-2}	-	159	92.5	7.25	50.6	3.66	7.7×10^{-5}	-	0.24	37.9	0.09	1.6×10^{-6}	2.7×10^{-7}	-	-	-
0489	1154.0	4.9×10^{-2}	-	197	94.2	7.31	47.9	3.51	-	-	1.20	35.7	0.43	5.9×10^{-5}	-	-	1.3×10^{-7}	-
0490	1160.1	5.0×10^{-2}	-	134	135	6.10	49.8	3.04	-	-	0.12	0	-	3.1×10^{-6}	1.2×10^{-6}	-	2.3×10^{-7}	-
0491	1169.4	3.9×10^{-2}	-	159	92.5	7.16	51.5	3.68	-	-	0.13	0	-	5.9×10^{-5}	"	-	9.5×10^{-7}	-
0492	1159.8	4.3×10^{-2}	-	130	118.2	5.36	51.1	2.74	-	-	0.23	51.8	0.12	6.1×10^{-5}	"	-	4.1×10^{-7}	-
0493	1155.9	6.6×10^{-2}	-	130	118.2	7.39	51.6	3.81	-	-	0.38	6.5	0.02	1.0×10^{-3}	-	-	5.9×10^{-7}	-
0494	1179.3	1.7×10^{-2}	-	130	118.2	5.33	51.3	2.73	1.3×10^{-4}	-	1.09	22.0	0.24	3.1×10^{-6}	3.4×10^{-7}	-	-	-
0495	1164.0	3.6×10^{-2}	-	130	118.2	6.36	51.7	3.29	-	-	0.54	9.2	0.05	3.2×10^{-5}	"	-	3.2×10^{-7}	-
0496	1177.4	2.6×10^{-2}	-	134	135	5.34	50.5	2.70	-	-	0.26	12.5	0.03	3.1×10^{-6}	3.3×10^{-7}	-	-	-
0497	1169.5	3.9×10^{-2}	-	130	118.2	6.88	51.4	3.54	-	-	0.20	62.5	0.13	1.2×10^{-5}	"	-	5.3×10^{-6}	-
0498	1198.9	2.1×10^{-2}	-	197	94.2	4.62	26.9	1.25	-	-	0.26	37.5	0.10	6.2×10^{-6}	2.9×10^{-6}	-	9.6×10^{-8}	-

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Table 3.1.16

Long End Plugs (7th Delivery)

No.	Original			First Impregnation							Second Impregnation						3rd Impr.	
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptakte %	Carbon Yield %	Sec. Carbon Cont. %	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin-Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeability, $cm^2\ sec^{-1}$ (Press.Dec.)	$cm^2\ sec^{-1}$ (Vac.Dec.)	Remarks	Permeab. $cm^2\ sec^{-1}$ (Vac.Dec.)	Remarks
0527	1172.9	2.8×10^{-2}	-	168	118.8	8.62	51.8	4.46	6.6×10^{-5}	-	0.04	0	-	1.7×10^{-5}	-	-	4.6×10^{-6}	-
0528	1163.6	5.1×10^{-2}	-	96	123.8	8.73	51.9	4.53	2.1×10^{-4}	-	0.11	7.7	0.01	3.4×10^{-5}	-	-	1.4×10^{-5}	-
0529	1182.0	1.8×10^{-2}	-	72	92.0	7.44	50.7	3.77	-	-	0.07	0	-	3.7×10^{-5}	-	-	1.3×10^{-5}	-
0530	1181.9	1.8×10^{-2}	-	48	111.0	5.63	50.4	2.84	-	-	0.09	0	-	4.7×10^{-6}	8.3×10^{-7}	-	-	-
0531	1163.9	4.2×10^{-2}	-	96	81.9	8.94	-	-	-	2	-	-	-	-	-	-	-	-
0532	1169.0	3.1×10^{-2}	-	72	92.0	8.15	50.5	4.11	-	-	0.11	0	-	3.9×10^{-5}	-	-	1.5×10^{-6}	-
0533	1173.5	2.9×10^{-2}	-	96	123.8	7.90	50.7	4.00	-	-	0.20	20.0	0.04	5.5×10^{-5}	-	-	1.4×10^{-5}	-
0534	1180.2	1.7×10^{-2}	-	96	85.0	6.02	50.1	3.02	-	-	0.14	0	0	6.2×10^{-6}	3.8×10^{-6}	-	1.4×10^{-6}	-
0535	1172.5	3.4×10^{-2}	-	96	85.0	8.37	50.2	4.20	-	-	0.12	0	-	2.2×10^{-5}	-	-	1.3×10^{-6}	-
0536	1182.5	2.1×10^{-2}	-	120	174.7	5.21	48.2	2.51	-	-	0.68	48.2	0.33	6.2×10^{-6}	5.7×10^{-7}	-	-	-
0537	1176.6	2.7×10^{-2}	-	48	111.0	7.19	51.3	3.69	-	-	0.09	0	-	6.7×10^{-5}	-	-	8.0×10^{-6}	-
0538	1173.7	3.4×10^{-2}	-	72	92.0	8.43	51.0	4.30	-	-	0.04	0	-	6.2×10^{-6}	4.5×10^{-6}	-	7.8×10^{-7}	-
0539	1171.4	3.8×10^{-2}	-	168	118.8	8.93	50.1	4.47	-	-	0.08	10.0	0.01	6.2×10^{-6}	1.5×10^{-6}	-	8.0×10^{-7}	-
0540	1173.3	3.2×10^{-2}	-	96	81.9	8.10	51.8	4.19	-	-	0.07	0	-	6.1×10^{-5}	-	-	1.3×10^{-5}	-
0541	1181.9	1.9×10^{-2}	-	96	81.9	6.11	50.7	3.10	-	1	0.06	0	-	1.5×10^{-5}	-	-	1.3×10^{-5}	-
0542	1179.5	2.6×10^{-2}	-	72	92.0	7.43	50.6	3.76	-	-	0.09	0	-	5.7×10^{-5}	-	-	1.5×10^{-5}	-
0544	1179.0	2.4×10^{-2}	-	96	81.9	6.40	51.1	3.27	-	-	0.07	0	-	2.0×10^{-5}	-	-	4.3×10^{-5}	-
0545	1174.6	2.5×10^{-2}	-	96	81.9	6.52	51.3	3.34	-	-	0.07	0	-	4.1×10^{-5}	-	-	4.1×10^{-5}	-
0546	1169.0	3.3×10^{-2}	-	96	85.0	7.47	50.7	3.79	-	-	0.06	0	-	2.6×10^{-5}	-	-	3.0×10^{-6}	-
0547	1180.6	2.3×10^{-2}	-	48	111.0	6.45	62.6	4.04	-	-	0	-	-	6.0×10^{-5}	-	-	1.7×10^{-5}	-
0548	1163.6	5.5×10^{-2}	-	96	123.8	9.03	51.6	4.66	-	-	0.36	47.7	0.17	6.2×10^{-6}	4.0×10^{-7}	-	-	-
0549	1180.1	2.1×10^{-2}	-	96	81.9	6.52	52.1	3.40	-	-	0.11	0	-	1.5×10^{-5}	-	-	3.5×10^{-5}	-
0551	1182.2	1.7×10^{-2}	-	48	111.0	5.63	49.8	2.80	2.8×10^{-4}	-	0.07	0	-	2.9×10^{-5}	-	-	2.7×10^{-5}	-
0552	1173.9	2.8×10^{-2}	-	48	111.0	7.53	50.0	3.76	-	-	0.16	0	-	7.8×10^{-6}	3.7×10^{-6}	-	1.3×10^{-6}	-
0553	1183.4	1.7×10^{-2}	-	96	85.0	6.51	51.7	3.37	-	-	0.05	0	-	9.4×10^{-6}	3.8×10^{-6}	-	8.2×10^{-7}	-
0554	1182.8	1.6×10^{-2}	-	96	123.8	5.74	51.1	2.93	-	-	0.05	0	-	1.8×10^{-5}	-	-	3.7×10^{-6}	-
0555	1182.0	1.7×10^{-2}	-	168	118.8	6.70	55.9	3.74	3.2×10^{-5}	-	0.03	-	-	2.0×10^{-5}	-	-	1.2×10^{-5}	-
0556	1178.6	2.2×10^{-2}	-	168	118.8	7.12	49.9	3.55	-	-	0.06	85.7	0.05	3.1×10^{-6}	2.1×10^{-6}	-	3.1×10^{-6}	-

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Table 3.1.16 (Continued)

Long End Plugs (7th Delivery)

No.	Original			First Impregnation							Second Impregantion						3rd Impr.	
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin-Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeability, $cm^2\ sec^{-1}$ (Press.Dec.)	(Vac. Dec.)	Remarks	Permeab. $cm^2\ sec^{-1}$ (Vac.Dec.)	Remarks
0557	1173.6	2.5×10^{-2}	-	96	85.0	7.40	50.7	3.75	-	-	0.06	0	-	$3,6 \times 10^{-5}$	-	-	1.6×10^{-5}	-
0558	1159.2	6.9×10^{-2}	-	48	111.0	10.01	-	-	-	2	-	-	-	-	-	-	-	-
0559	1154.9	6.5×10^{-2}	-	96	81.9	9.64	50.9	-	-	-	0.07	0	-	1.0×10^{-4}	-	-	5.1×10^{-6}	-
0560	1159.0	5.4×10^{-2}	-	168	118.8	9.51	49.4	4.70	-	-	0.21	50.0	0.10	6.2×10^{-6}	3.7×10^{-7}	1	-	-
0561	1156.2	6.4×10^{-2}	-	168	118.8	9.55	50.1	4.78	-	-	0.11	42.9	0.05	6.2×10^{-6}	1.8×10^{-6}	-	5.0×10^{-7}	-
0562	1182.0	2.2×10^{-2}	-	72	92.0	7.80	50.9	3.97	-	-	0.07	0	-	3.9×10^{-5}	-	-	8.5×10^{-6}	-
0563	1178.3	2.6×10^{-2}	-	216	86.5	6.79	50.0	3.39	-	-	0.07	(100.0)	0.07	1.1×10^{-5}	-	-	5.1×10^{-6}	-
0564	1174.0	3.3×10^{-2}	-	48	111.0	7.78	49.4	3.84	-	-	0.18	4.5	0.01	1.5×10^{-5}	-	-	9.2×10^{-6}	-
0565	1166.1	4.0×10^{-2}	-	96	85.0	8.85	50.7	4.49	-	-	0.16	0	0	1.3×10^{-5}	-	-	5.8×10^{-6}	-
0566	1167.8	4.2×10^{-2}	-	96	81.9	8.62	51.3	4.42	-	-	0.13	0	-	3.7×10^{-5}	-	-	1.8×10^{-5}	-
0567	1172.3	2.6×10^{-2}	-	96	85.0	8.03	50.9	4.09	-	-	0.12	0	-	6.2×10^{-6}	7.5×10^{-6}	-	1.9×10^{-5}	-
0568	1177.4	2.1×10^{-2}	-	96	85.0	6.61	49.9	3.24	-	-	0.09	0	-	3.2×10^{-5}	-	-	1.4×10^{-5}	-
0569	1179.9	2.0×10^{-2}	-	168	118.8	7.23	49.6	3.59	-	-	0.09	54.5	0.05	6.2×10^{-6}	1.2×10^{-6}	-	1.4×10^{-6}	-
0570	1162.1	5.2×10^{-2}	-	96	123.8	8.83	52.0	4.59	-	-	0.17	14.3	0.02	2.5×10^{-5}	-	-	3.5×10^{-7}	-
0571	1173.6	2.0×10^{-2}	-	72	92.0	7.52	51.9	3.90	4.0×10^{-5}	-	0.05	0	-	1.4×10^{-5}	-	-	6.7×10^{-6}	-
0572	1176.1	2.8×10^{-2}	-	96	81.9	7.13	50.9	3.63	-	-	0.07	0	-	3.1×10^{-5}	-	-	1.3×10^{-5}	-
0573	1153.7	5.9×10^{-2}	-	144	110.0	8.42	53.8	4.53	-	-	0.41	36.0	0.15	1.6×10^{-6}	1.4×10^{-6}	-	2.6×10^{-7}	-
0574	1182.4	2.2×10^{-2}	-	96	123.8	6.67	51.1	3.41	-	-	0.06	0	-	2.6×10^{-5}	-	-	3.6×10^{-5}	-
0575	1157.5	2.4×10^{-2}	-	120	174.7	6.48	49.3	3.19	-	-	0.08	30.0	0.02	6.2×10^{-6}	2.1×10^{-6}	-	1.9×10^{-6}	-
0576	1191.6	7.9×10^{-3}	-	96	101.2	5.26	51.7	2.72	-	-	0	-	-	7.8×10^{-6}	2.2×10^{-6}	-	4.1×10^{-7}	-
0577	1149.5	4.5×10^{-2}	-	96	123.8	8.05	52.1	4.19	1.6×10^{-4}	-	0.16	0	-	1.6×10^{-6}	1.7×10^{-6}	-	6.9×10^{-7}	-
0578	1164.0	2.7×10^{-2}	-	48	111.0	7.07	52.1	3.68	3.8×10^{-4}	-	0.13	0	-	2.4×10^{-5}	-	-	3.1×10^{-6}	-
0579	1173.4	1.5×10^{-2}	-	96	123.8	5.76	52.5	3.02	-	-	0.11	7.7	0.01	1.6×10^{-6}	2.9×10^{-6}	-	2.2×10^{-7}	-
0580	1177.9	1.3×10^{-2}	-	72	92.0	5.95	51.3	3.05	-	-	0.09	-	-	1.4×10^{-5}	-	-	1.1×10^{-6}	-
0581	1163.0	3.1×10^{-2}	-	96	123.8	7.73	52.3	4.04	-	-	0.04	0	-	4.2×10^{-5}	-	-	8.9×10^{-6}	-
0582	1151.9	5.6×10^{-2}	-	96	85.0	8.04	50.7	4.08	-	-	0.12	0	-	8.3×10^{-5}	-	-	5.8×10^{-5}	-
0583	1195.1	8.3×10^{-3}	-	96	81.9	4.46	50.1	2.23	-	-	0.07	0	-	4.7×10^{-6}	2.2×10^{-6}	-	3.5×10^{-7}	-
0584	1184.4	8.4×10^{-3}	-	168	118.8	4.85	54.7	2.65	2.1×10^{-5}	-	0	-	-	1.7×10^{-5}	-	-	2.8×10^{-6}	-

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Table 3.1.16 (Continued)

Long End Plugs (7th Delivery)

No.	Original			First Impregnation							Second Impregnation						3rd Impr.	
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin-Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeability, $cm^2\ sec^{-1}$ (Press.Dec.)	(Vac. Dec.)	Remarks	Permeab. $cm^2\ sec^{-1}$ (Vac.Dec.)	Remarks
0585	1170.0	2.4×10^{-2}	-	96	85.0	7.65	52.6	4.02	6.2×10^{-5}	-	0.08	0	-	1.5×10^{-5}	-	-	6.6×10^{-6}	-
0586	1169.1	3.0×10^{-2}	-	168	118.8	8.11	49.4	4.01	-	-	0.06	85.7	0.05	4.7×10^{-6}	5.9×10^{-7}	-	-	-
0587	1154.2	2.4×10^{-2}	-	72	92.0	7.78	52.1	4.05	-	-	0.07	44.4	0.03	2.1×10^{-5}	-	-	2.3×10^{-5}	-
0588	1164.6	2.7×10^{-2}	-	216	86.5	7.69	50.1	3.85	1.4×10^{-4}	-	0.08	90.0	0.07	7.8×10^{-6}	4.7×10^{-7}	-	-	-
0589	1164.2	2.2×10^{-2}	-	144	110.0	7.21	55.0	3.96	-	-	0.21	42.3	0.09	2.4×10^{-5}	-	-	5.9×10^{-7}	-
0590	1178.2	1.6×10^{-2}	-	216	99.4	6.87	52.0	3.57	-	-	0.06	0	-	1.5×10^{-5}	-	-	2.3×10^{-5}	-
0591	1148.1	5.7×10^{-2}	-	120	174.7	6.56	50.9	3.34	-	-	0.77	28.6	0.22	6.2×10^{-6}	2.2×10^{-6}	-	8.4×10^{-7}	-
0592	1152.2	3.3×10^{-2}	-	96	101.2	7.40	51.7	3.83	-	-	0.14	0	-	2.5×10^{-4}	-	-	8.7×10^{-5}	-
0593	1167.4	2.2×10^{-2}	-	96	101.2	7.43	51.3	3.81	-	-	0.17	0	-	7.8×10^{-6}	1.7×10^{-6}	-	1.5×10^{-6}	-
0594	1172.9	1.2×10^{-2}	-	48	111.0	4.67	52.0	2.43	-	-	0.07	0	-	9.4×10^{-6}	3.1×10^{-6}	-	2.5×10^{-6}	-
0595	1158.8	3.2×10^{-2}	-	216	86.5	8.60	49.9	4.29	-	-	0.12	85.7	0.10	9.4×10^{-6}	1.6×10^{-6}	-	1.0×10^{-6}	-
0596	1170.6	1.3×10^{-2}	-	96	123.8	5.53	52.4	2.90	-	-	0.06	0	0	3.1×10^{-6}	1.0×10^{-6}	-	2.1×10^{-6}	-
0597	1147.2	6.5×10^{-2}	-	72	92.0	9.50	51.4	4.88	-	-	0.10	0	-	1.7×10^{-5}	-	-	1.7×10^{-7}	-
0598	1192.6	7.8×10^{-3}	-	216	86.5	5.33	48.6	2.59	-	-	0.05	-	-	6.2×10^{-6}	6.0×10^{-7}	-	-	-
0599	1170.4	2.3×10^{-2}	-	216	99.4	5.73	52.3	3.00	-	-	0.06	-	-	1.2×10^{-5}	-	-	2.6×10^{-6}	-
0600	1175.0	1.8×10^{-2}	-	168	118.8	6.91	49.9	3.45	-	-	0.07	-	-	6.2×10^{-6}	1.9×10^{-6}	-	7.1×10^{-7}	-
0601	1171.3	2.0×10^{-2}	-	216	86.5	7.49	50.4	3.77	-	-	0.06	0	-	6.2×10^{-6}	3.8×10^{-6}	-	4.2×10^{-7}	-
0602	1170.6	1.6×10^{-2}	-	216	99.4	6.95	51.8	3.60	-	-	0.04	0	-	6.2×10^{-6}	4.5×10^{-6}	-	3.3×10^{-6}	-
0603	1171.0	2.6×10^{-2}	-	216	99.4	7.20	52.5	3.78	-	-	0.07	0	-	4.2×10^{-5}	-	-	7.8×10^{-6}	-
0604	1164.5	3.1×10^{-2}	-	96	101.2	7.00	53.1	3.72	-	-	0	-	-	2.7×10^{-5}	-	-	2.5×10^{-5}	-
0605	1165.4	3.1×10^{-2}	-	72	92.0	8.55	51.6	4.41	-	-	0.02	0	-	7.8×10^{-6}	4.0×10^{-6}	-	3.1×10^{-6}	-
0606	1168.6	2.2×10^{-2}	-	120	174.7	8.57	40.7	3.49	-	-	0.07	0	-	9.4×10^{-6}	1.0×10^{-5}	-	8.8×10^{-7}	-
0607	1159.6	2.5×10^{-2}	-	120	174.7	5.38	48.6	2.61	2.3×10^{-4}	-	0.13	0	-	4.7×10^{-6}	1.2×10^{-6}	-	5.2×10^{-7}	-
0608	1176.3	1.3×10^{-2}	-	216	86.5	7.03	50.4	3.54	-	-	0.08	50.0	0.04	3.1×10^{-6}	3.0×10^{-7}	-	-	-
0609	1178.9	1.3×10^{-2}	-	216	86.5	6.54	50.7	3.32	-	-	0.02	66.7	0.01	4.7×10^{-6}	2.6×10^{-7}	-	-	-
0610	1154.5	3.5×10^{-2}	-	144	115.8	7.77	54.8	4.26	-	-	0.29	0	-	3.1×10^{-6}	1.8×10^{-6}	-	4.6×10^{-7}	-
0611	1162.7	2.2×10^{-2}	-	216	86.5	7.95	50.5	4.01	-	-	0.08	20.2	0.02	3.1×10^{-6}	4.4×10^{-7}	-	-	-

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Table 3.1.16 (Continued)

Long End Plugs (7th Delivery)

No.	Original			First Impregnation							Second Impregnation						3rd Impr.	
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin-Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeability, $cm^2\ sec^{-1}$ (Press.Dec.)	(Vac. Dec.)	Remarks	Permeab. $cm^2\ sec^{-1}$ (Vac.Dec.)	Remarks
0612	1153.3	6.2×10^{-2}	-	120	174.7	6.36	50.5	3.21	-	-	0.12	35.7	0.04	1.3×10^{-5}	-	-	1.7×10^{-6}	-
0613	1169.0	1.9×10^{-2}	-	216	99.4	7.54	52.8	3.98	-	-	0.30	13.5	0.04	1.1×10^{-5}	-	-	1.4×10^{-6}	-
0614	1189.7	9.0×10^{-3}	-	144	110.0	5.26	53.8	2.83	-	-	0	-	-	9.4×10^{-6}	6.6×10^{-6}	-	6.6×10^{-6}	-
0615	1196.0	7.2×10^{-3}	-	144	110.0	4.18	-	-	-	2	-	-	-	-	-	-	-	-
0616	1156.2	4.0×10^{-2}	-	216	86.5	8.32	51.6	4.29	-	-	0.20	54.1	0.01	6.2×10^{-6}	2.0×10^{-6}	-	1.0×10^{-6}	-
0617	1144.1	3.0×10^{-2}	-	144	110.0	7.46	53.3	3.98	-	-	0.12	0	0	1.8×10^{-5}	-	-	1.4×10^{-6}	-
0618	1165.5	2.4×10^{-2}	-	96	101.2	7.73	51.4	3.97	-	-	0	-	-	2.2×10^{-5}	-	-	1.3×10^{-6}	-
0619	1165.2	2.3×10^{-2}	-	120	174.7	5.74	50.8	2.92	-	-	0.38	39.1	0.15	1.3×10^{-5}	-	-	1.2×10^{-7}	-
0620	1166.7	3.4×10^{-2}	-	96	101.2	6.82	50.6	3.45	-	-	0	-	-	1.1×10^{-4}	-	-	3.0×10^{-7}	-
0621	1160.9	3.1×10^{-2}	-	48	111.0	7.70	50.4	3.88	-	-	0.12	0	-	2.8×10^{-4}	-	-	6.0×10^{-7}	-
0622	1149.4	3.2×10^{-2}	-	120	174.7	6.53	50.3	3.28	-	-	0.13	37.5	0.05	6.2×10^{-6}	1.5×10^{-6}	-	2.5×10^{-6}	-
0623	1169.2	1.5×10^{-2}	-	144	110.0	6.29	54.6	3.43	-	-	0.13	50.0	0.07	6.2×10^{-6}	1.3×10^{-6}	-	1.4×10^{-7}	-
0624	1161.7	2.4×10^{-2}	-	144	110.0	7.66	54.0	4.14	-	-	0.22	37.0	0.08	4.7×10^{-5}	2.1×10^{-6}	-	3.3×10^{-7}	-
0625	1172.3	2.1×10^{-2}	-	96	101.2	7.22	51.6	3.72	-	-	0.11	0	-	1.4×10^{-6}	-	-	8.9×10^{-6}	-
0626	1159.5	3.1×10^{-2}	-	120	174.7	5.98	50.4	3.01	-	-	0.09	0	-	6.2×10^{-6}	4.2×10^{-6}	-	7.8×10^{-6}	-
0627	1155.2	2.9×10^{-2}	-	216	99.4	6.72	51.3	3.45	-	-	0	0	0	$< 10^{-6}$	6.1×10^{-7}	-	-	-
0628	1155.1	3.9×10^{-2}	-	144	110.0	7.35	55.2	4.06	3.0×10^{-4}	-	0.12	66.7	0.08	7.8×10^{-6}	4.2×10^{-6}	-	4.2×10^{-7}	-
0629	1171.3	1.3×10^{-2}	-	96	101.2	6.46	51.4	3.32	-	-	0.10	41.7	0.04	6.2×10^{-6}	5.4×10^{-7}	-	-	-
0630	1163.2	2.5×10^{-2}	-	216	86.5	7.08	50.6	3.58	8.9×10^{-5}	-	0.07	55.5	0.04	4.7×10^{-5}	3.0×10^{-7}	-	-	-
0631	1155.9	4.4×10^{-2}	-	96	101.2	4.94	49.2	2.43	-	-	2.93	53.0	1.55	1.9×10^{-6}	-	-	1.9×10^{-6}	-
0632	1161.2	2.2×10^{-2}	-	120	174.7	5.61	50.0	2.85	1.5×10^{-4}	-	0.13	0	-	6.2×10^{-6}	2.5×10^{-6}	-	4.4×10^{-7}	-
0633	1162.9	2.0×10^{-2}	-	144	110.0	7.02	53.1	3.73	-	-	0.09	9.1	0.01	4.7×10^{-6}	2.9×10^{-6}	-	1.3×10^{-5}	-
0634	1172.8	2.1×10^{-2}	-	96	101.2	7.37	51.2	3.77	-	-	0.05	0	-	4.7×10^{-6}	5.7×10^{-6}	-	6.4×10^{-6}	-
0635	1169.8	2.4×10^{-2}	-	216	99.4	6.56	51.6	3.38	-	-	0.03	0	-	1.3×10^{-5}	-	-	1.8×10^{-6}	-

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Table 3.1.17

Long End Plugs (7th Delivery, Seven Element Rig)

No.	Original			First Impregnation							Second Impregnation						3rd Impr.	
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin-Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeability, $cm^2\ sec^{-1}$ (Press.Dec.)	(Vac. Dec.)	Remarks	Permeab. $cm^2\ sec^{-1}$ (Vac.Dec.)	Remarks
BP 1	1045.5	5.4×10^{-2}	-	216	110.2	5.56	47.3	2.63	-	-	0.15	37.5	0.06	6.2×10^{-6}	2.8×10^{-6}	-	-	-
BP 2	1040.9	6.6×10^{-2}	-	504	80.3	9.04	50.7	4.51	-	-	0.22	33.3	0.07	$< 10^{-6}$	spalled during measuring			
BP 3	1048.0	4.1×10^{-2}	-	216	110.2	7.27	49.9	3.63	3.4×10^{-4}	-	0.38	17.1	0.07	4.7×10^{-6}	1.9×10^{-6}	-	-	-
BP 4	1035.8	5.3×10^{-2}	-	216	99.4	8.98	50.5	4.53	-	-	0.23	20.0	0.05	4.7×10^{-5}	3.5×10^{-5}	-	-	-
BP 5	1038.0	5.6×10^{-2}	-	216	110.2	7.48	49.9	3.73	2.0×10^{-4}	-	0.14	60.0	0.08	1.5×10^{-5}	1.1×10^{-7}	-	-	-
BP 6	1032.9	6.4×10^{-2}	-	504	80.3	9.54	50.3	4.79	-	-	0.23	32.0	0.07	1.6×10^{-6}	6.2×10^{-7}	-	-	-
BP 7	1043.3	5.9×10^{-2}	-	504	80.3	8.79	50.4	4.43	-	-	0.23	36.0	0.08	9.4×10^{-6}	1.1×10^{-6}	-	-	-
BP 8	1046.1	4.0×10^{-2}	-	216	110.2	5.82	47.1	2.74	-	-	0.37	42.5	0.16	7.7×10^{-5}	-	-	3.6×10^{-6}	-
BP 9	1025.6	7.3×10^{-2}	-	504	80.3	9.80	50.4	4.94	-	-	0.52	39.3	0.20	7.8×10^{-6}	4.0×10^{-6}	-	-	-
BP 10	1031.2	7.6×10^{-2}	-	216	99.4	9.44	51.2	4.83	-	-	0.17	0	0	6.2×10^{-6}	2.2×10^{-6}	-	-	-
BP 11	1045.1	4.4×10^{-2}	-	216	110.2	5.99	43.3	2.60	-	-	0.51	49.1	0.25	1.3×10^{-5}	9.9×10^{-6}	-	-	-
BP 12	1032.8	6.9×10^{-2}	-	216	110.2	6.66	48.2	3.21	-	-	0.21	13.6	0.03	6.2×10^{-6}	2.1×10^{-6}	-	-	-
BP 13	1038.8	5.3×10^{-2}	-	216	110.2	7.30	49.9	3.64	-	-	0.22	16.7	0.04	6.2×10^{-6}	1.1×10^{-6}	-	-	-
BP 14	1049.8	3.9×10^{-2}	-	216	110.2	6.93	49.2	3.41	-	-	0.46	40.0	0.18	2.6×10^{-5}	-	-	6.3×10^{-7}	-
BP 15	1037.2	5.2×10^{-2}	-	216	99.4	9.43	52.0	4.90	-	-	0.09	0	0	7.8×10^{-6}	1.4×10^{-6}	-	-	-
BP 16	1042.5	4.5×10^{-2}	-	72	140.1	7.20	55.3	3.98	-	-	0.20	18.2	0.04	8.3×10^{-5}	-	-	1.8×10^{-6}	-
BP 17	1045.5	3.8×10^{-2}	-	72	140.1	6.87	55.6	3.82	-	-	0.08	0	-	3.0×10^{-5}	-	-	1.5×10^{-6}	-
BP 18	1042.2	4.4×10^{-2}	-	216	99.4	8.53	48.9	4.19	-	-	0.16	11.8	0.02	1.6×10^{-6}	5.3×10^{-7}	-	-	-
BP 19	1044.0	4.2×10^{-2}	-	216	190.0	6.56	46.0	3.02	-	-	0.34	45.9	0.16	1.3×10^{-4}	-	-	4.1×10^{-7}	-
BP 20	1031.1	6.8×10^{-2}	-	72	140.1	7.86	55.1	4.33	-	-	0.29	16.1	0.05	3.1×10^{-6}	9.2×10^{-7}	-	-	-
BP 21	1039.1	4.6×10^{-2}	-	216	99.4	8.57	47.0	4.03	1.3×10^{-4}	-	0.17	5.5	0.009	3.1×10^{-6}	1.0×10^{-6}	-	-	-
BP 22	1037.3	5.9×10^{-2}	-	216	110.2	6.36	49.7	3.16	-	-	0.12	15.4	0.02	1.2×10^{-5}	2.5×10^{-6}	-	-	-
BP 23	1040.9	5.7×10^{-2}	-	72	140.1	7.50	55.6	4.17	-	-	0.12	0	-	5.5×10^{-5}	-	-	1.2×10^{-5}	-
BP 24	1041.7	4.5×10^{-2}	-	504	80.3	8.70	50.5	4.39	-	-	0.16	16.7	0.03	4.7×10^{-6}	6.6×10^{-7}	-	-	-
BP 25	1046.9	4.4×10^{-2}	-	72	140.1	6.51	50.0	3.25	6.7×10^{-5}	-	0.13	7.1	0.009	1.2×10^{-5}	6.6×10^{-6}	-	-	-
BP 26	1032.7	7.6×10^{-2}	-	72	140.1	7.63	-	-	-	2								
BP 27	1033.8	7.0×10^{-2}	-	216	99.4	9.27	50.9	4.72	-	-	0.22	16.7	0.04	4.7×10^{-6}	1.8×10^{-7}	-	-	-
BP 28	1038.0	5.5×10^{-2}	-	216	99.4	9.10	51.6	4.70	-	-	0.11	41.7	0.05	6.2×10^{-6}	1.7×10^{-6}	-	-	-

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Table 3.1.17 (Continued)

Long End Plugs (7th Delivery, Seven Element Rig)

No.	Original			First Impregnation							Second Impregnation						3rd Impr.	
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin-Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeability, $cm^2\ sec^{-1}$ (Press.Dec.)	(Vac. Dec.)	Remarks	Permeab. $cm^2\ sec^{-1}$ (Vac.Dec.)	Remarks
BP 29	1034.7	5.9×10^{-2}	-	72	140.1	7.68	54.5	4.19	-	-	0.20	59.1	0.12	3.1×10^{-5}	-	-	2.1×10^{-7}	-
BP 30	1028.0	8.3×10^{-2}	-	216	110.2	6.46	44.0	2.84	-	-	0.88	45.2	0.40	3.5×10^{-5}	-	-	6.2×10^{-7}	-
BP 31	1043.7	7.0×10^{-2}	-	216	99.4	9.10	51.4	4.68	-	-	0.16	29.4	0.05	3.1×10^{-6}	3.0×10^{-7}	-	-	-
BP 32	1030.1	7.3×10^{-2}	-	216	99.4	9.61	51.5	4.95	-	-	0.21	13.0	0.03	3.1×10^{-6}	9.0×10^{-7}	-	-	-
BP 33	1045.7	5.1×10^{-2}	-	216	110.2	7.20	49.9	3.59	-	-	1.22	48.5	0.49	6.2×10^{-6}	5.1×10^{-7}	-	-	-
BP 34	1050.0	3.4×10^{-2}	-	216	99.4	8.10	51.1	4.14	-	-	0.11	0	-	7.8×10^{-6}	1.3×10^{-6}	-	-	-
BP 35	1043.9	4.8×10^{-2}	-	504	80.3	7.95	49.5	3.94	-	-	0.21	26.1	0.05	6.2×10^{-6}	7.4×10^{-7}	-	-	-
BP 36	1031.9	7.2×10^{-2}	-	216	99.4	9.47	51.4	4.87	-	-	0.18	0	-	3.1×10^{-6}	4.4×10^{-7}	-	-	-
BP 37	1048.0	4.4×10^{-2}	-	72	140.1	6.87	56.1	3.85	-	-	0.18	0	-	1.3×10^{-5}	6.0×10^{-6}	-	-	-
BP 38	1043.0	4.3×10^{-2}	-	72	140.1	6.92	53.5	3.70	-	-	0.40	32.6	0.13	3.1×10^{-5}	-	-	2.4×10^{-7}	-
BP 39	1042.1	4.7×10^{-2}	-	216	99.4	8.65	48.0	4.15	-	-	0.21	21.7	0.05	2.9×10^{-5}	-	-	4.2×10^{-7}	-
BP 40	1041.0	7.8×10^{-2}	-	216	99.4	9.27	50.9	4.72	-	-	0.13	0	-	4.7×10^{-6}	3.6×10^{-7}	-	-	-
BP 41	1048.3	3.6×10^{-2}	-	504	80.3	7.89	49.4	3.90	-	-	0.21	34.8	0.07	7.8×10^{-6}	6.6×10^{-7}	-	-	-
BP 42	1033.8	5.7×10^{-2}	-	216	190.0	7.19	48.2	3.46	-	-	0.20	19.0	0.04	6.2×10^{-6}	4.8×10^{-7}	-	-	-
BP 43	1037.5	5.7×10^{-2}	-	504	80.3	8.21	50.1	4.11	-	-	0.24	23.1	0.06	3.1×10^{-6}	6.0×10^{-7}	-	-	-
BP 44	1032.5	7.9×10^{-2}	-	216	190.0	7.81	47.3	3.69	5.8×10^{-4}	-	0.15	68.7	0.10	1.2×10^{-5}	5.2×10^{-6}	-	-	-
BP 45	1039.4	6.3×10^{-2}	-	504	80.3	9.20	50.5	4.65	-	-	0.26	10.7	0.03	1.6×10^{-6}	4.4×10^{-7}	-	-	-
BP 46	1024.5	1.3×10^{-1}	-	216	110.2	9.09	50.4	4.58	-	-	0.29	54.8	0.16	6.2×10^{-6}	1.3×10^{-6}	-	-	-
BP 47	1033.1	5.9×10^{-2}	-	216	110.2	6.84	51.5	3.52	-	-	0.21	39.1	0.08	1.1×10^{-5}	2.0×10^{-6}	-	-	-
BP 48	1031.1	7.5×10^{-2}	-	216	190.0	7.93	47.5	3.77	-	-	0.28	30.0	0.08	1.2×10^{-5}	2.8×10^{-6}	-	-	-
BP 49	1045.1	7.1×10^{-2}	-	216	110.2	5.40	50.5	2.73	-	-	0.12	7.7	0.009	3.8×10^{-5}	-	-	4.9×10^{-6}	-
BP 50	1049.5	6.2×10^{-2}	-	216	190.0	7.24	46.7	3.38	-	-	0.24	11.5	0.03	2.2×10^{-5}	-	-	-	-
BP 51	1036.3	6.5×10^{-2}	-	216	190.0	7.31	43.3	3.17	-	-	0.45	39.6	0.18	6.2×10^{-6}	1.2×10^{-6}	-	-	-
BP 52	1033.8	4.8×10^{-2}	-	216	190.0	6.89	46.2	4.42	-	-	0.51	46.3	0.24	1.2×10^{-5}	1.9×10^{-6}	-	-	-
BP 53	1038.0	7.1×10^{-2}	-	216	190.0	7.64	44.8	3.42	-	-	0.37	40.0	0.15	9.4×10^{-6}	2.1×10^{-6}	-	-	-
BP 54	1031.7	6.3×10^{-2}	-	216	110.2	6.14	47.9	2.94	-	-	0.28	46.7	0.13	6.2×10^{-5}	9.8×10^{-7}	-	-	-
BP 55	1034.5	5.9×10^{-2}	-	216	110.2	5.99	46.1	2.76	-	-	0.13	50.0	0.07	2.8×10^{-5}	-	-	3.0×10^{-6}	-
BP 56	1046.4	4.9×10^{-2}	-	504	80.3	8.40	49.6	4.17	-	-	0.22	16.7	0.08	$< 10^{-6}$	4.1×10^{-7}	-	-	-

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Table 3.1.17 (Continued)

Long End Plugs (7th Delivery, Seven Element Rig)

No.	Original			First Impregnation							Second Impregnation						3rd Impr.	
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin-Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeability, $cm^2\ sec^{-1}$ (Press.Dec.)	(Vac.Dec.)	Remarks	Permeab. $cm^2\ sec^{-1}$ (Vac.Dec.)	Remarks
BP 57	1032.2	6.6×10^{-2}	-	504	80.3	9.43	50.1	4.72	-	-	0.32	22.9	0.07	$<10^{-6}$	4.2×10^{-7}	-	-	-
BP 58	1044.0	6.9×10^{-2}	-	216	110.2	5.75	48.8	2.81	8.3×10^{-4}	-	0.11	75.0	0.08	2.2×10^{-5}	-	-	3.0×10^{-6}	-
BP 59	1039.4	4.3×10^{-2}	-	216	190.0	6.53	46.7	3.05	-	-	0.27	51.7	0.14	2.6×10^{-4}	-	-	1.2×10^{-6}	-
BP 60	1020.8	1.4×10^{-1}	-	216	110.2	9.30	49.7	4.62	-	-	0.37	45.0	0.17	7.8×10^{-6}	5.5×10^{-7}	-	-	-
BP 61	1038.6	6.0×10^{-2}	-	216	110.2	7.07	47.9	3.39	-	-	0.16	17.6	0.03	6.2×10^{-6}	1.8×10^{-6}	-	-	-
BP 62	1034.9	8.4×10^{-2}	-	504	80.3	9.58	50.4	4.83	-	-	0.28	23.3	0.07	3.1×10^{-6}	2.3×10^{-6}	-	-	-
BP 63	1053.3	3.7×10^{-2}	-	504	80.3	8.54	44.4	3.79	-	-	0.54	81.3	0.44	4.7×10^{-6}	4.3×10^{-7}	-	-	-
BP 64	1050.4	3.7×10^{-2}	-	216	190.0	5.85	43.7	2.56	-	-	0.80	46.5	0.37	3.0×10^{-5}	-	-	4.1×10^{-7}	-
BP 65	1037.3	4.7×10^{-2}	-	504	80.3	9.00	49.2	4.43	-	-	0.22	12.5	0.03	$<10^{-6}$	3.3×10^{-7}	-	-	-
BP 66	1042.4	7.4×10^{-2}	-	216	110.2	5.89	50.0	2.94	-	-	0.08	0	-	6.0×10^{-5}	-	-	4.8×10^{-6}	-

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Table 3.1.18

Short End Plugs (1^{st} Delivery)

No.	Original			First Impregnation								Second Impregnation						
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Polym.-Content %	Carbon Yield %	Sec. Carb. Cont. %	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin-Uptake %	Polym.-Content %	Carbon Yield %	Sec. Carb. Cont. %	Permeability, $cm^2\ sec^{-1}$ (Press.Dec.)	(Vac. Dec.)	Remarks
0065	885.7	4.0×10^{-2}	-	200	94.4	8.62	8.30	-	-	-	2	-	-	-	-	-	-	-
0066	879.3	8.2×10^{-2}	-	200	94.4	9.06	8.62	-	-	-	2	-	-	-	-	-	-	-
0067	875.4	8.3×10^{-2}	-	200	94.4	8.64	8.34	51.8	4.47	3.2×10^{-4}	-	0.27	0.076	4.0	0.01	$< 10^{-5}$	-	-
0068	877.8	6.9×10^{-2}	-	200	94.4	9.17	8.64	51.4	4.72	2.7×10^{-4}	-	0.67	0.51	32.2	0.22	-	-	2
0069	872.9	8.7×10^{-2}	-	200	94.4	9.43	8.98	-	-	-	3	-	-	-	-	-	-	-
0070	874.2	7.4×10^{-2}	-	200	94.4	9.25	8.63	51.7	4.78	3.3×10^{-4}	-	0.47	0.26	28.0	0.13	1.6×10^{-5}	-	-
0071	877.1	7.7×10^{-2}	-	200	94.4	8.85	8.44	-	-	-	2	-	-	-	-	-	-	-
0072	871.8	3.8×10^{-2}	-	210	107.0	4.27	3.74	50.5	2.16	1.5×10^{-3}	-	1.29	0.65	25.2	0.33	$< 10^{-5}$	-	-
0073	877.2	3.1×10^{-2}	-	210	107.0	8.25	7.81	47.4	3.91	3.9×10^{-5}	-	0.20	0.055	0	0	2.2×10^{-5}	-	-
0074	882.4	3.8×10^{-2}	-	200	94.4	8.33	7.96	-	-	-	2	-	-	-	-	-	-	-
0075	877.5	7.6×10^{-2}	-	200	94.4	9.02	8.49	-	-	-	3	-	-	-	-	-	-	-
0076	877.0	3.4×10^{-2}	-	210	107.0	8.78	8.26	51.4	4.52	6.2×10^{-5}	-	0.21	0.03	0	0	$< 10^{-5}$	-	-

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Table 3.1.19

Short End Plugs (2nd Delivery)

No.	Original			First Impregnation								Second Impregnation						3rd Impr.	
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Polym.-Content %	Carbon Yield %	Sec. Carb. Cont. %	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin-Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeability, $cm^2 sec^{-1}$ (Press.Dec.)	(Vac. Dec.)	Remarks	Permeab. $cm^2\ sec^{-1}$ (Vac.Dec.)	Remarks
0224	877.4	4.2×10^{-2}	-	216	131	8.59	broken during curing			-	3	-	-	-	-	-	-	-	-
0225	878.4	4.2×10^{-2}	-	216	131	8.90	7.59	51.1	4.55	9.4×10^{-5}	-	0.27	0	-	$<10^{-6}$	1.2×10^{-7}	-	-	-
0226	882.5	2.6×10^{-2}	-	216	252	8.55	7.88	50.5	4.32	5.7×10^{-5}	-	0.26	0	-	$<10^{-6}$	4.6×10^{-7}	-	-	-
0227	879.8	3.1×10^{-2}	-	216	252	8.90	8.23	50.6	4.52	1.4×10^{-4}	-	0.13	0	-	$<10^{-6}$	4.1×10^{-7}	-	-	-
0228	869.0	3.7×10^{-2}	-	216	252	8.91	8.37	50.4	4.49	1.7×10^{-4}	-	0.20	13.8	0.03	$<10^{-6}$	1.7×10^{-7}	-	-	-
0229	877.5	3.8×10^{-2}	-	216	131	8.46	7.32	51.5	4.36	6.3×10^{-5}	-	0.15	0	-	3.2×10^{-6}	9.1×10^{-7}	-	5.0×10^{-8}	-
0230	873.2	3.8×10^{-2}	-	216	131	8.74	7.71	51.1	4.47	6.2×10^{-5}	-	0.08	0	-	1.7×10^{-5}	-	-	1.1×10^{-7}	-
0231	894.5	1.3×10^{-2}	-	168	75	7.43	6.93	-	-	-	3	-	-	-	-	-	-	-	-
0232	890.0	1.4×10^{-2}	-	528	178	7.21	6.34	50.1	3.61	9.8×10^{-5}	-	0.30	0	-	1.8×10^{-6}	2.4×10^{-7}	-	-	-
0233	878.0	4.3×10^{-2}	-	192	185	8.60	8.06	-	-	-	3	-	-	-	-	-	-	-	-
0234	879.9	3.2×10^{-2}	-	192	185	8.19	7.68	-	-	-	3	-	-	-	-	-	-	-	-
0235	885.3	2.7×10^{-2}	-	528	178	8.29	7.42	51.4	4.26	4.4×10^{-5}	-	0.21	0	-	$<10^{-6}$	1.3×10^{-7}	-	-	-
0236	894.8	1.4×10^{-2}	-	216	131	6.90	5.58	51.4	3.55	2.9×10^{-5}	-	0.17	0	-	1.8×10^{-6}	5.0×10^{-7}	-	2.0×10^{-7}	-
0237	876.6	4.3×10^{-2}	-	168	75	8.60	8.00	56.0	4.48	3.9×10^{-5}	-	0.07	0	-	1.5×10^{-5}	-	-	5.8×10^{-7}	-
0238	873.5	4.2×10^{-2}	-	216	252	8.89	8.31	50.5	4.20	1.1×10^{-4}	-	0.16	0	-	$<10^{-6}$	3.6×10^{-7}	-	-	-
0239	866.2	3.2×10^{-2}	-	192	185	9.10	8.54	53.0	-	-	3	-	-	-	-	-	-	-	-
0240	878.4	2.5×10^{-2}	-	216	252	8.56	7.99	50.6	4.33	6.1×10^{-5}	-	0.03	0	-	$<10^{-6}$	8.6×10^{-8}	-	-	-
0241	877.7	3.1×10^{-2}	-	216	252	8.50	7.96	-	-	-	3	-	-	-	-	-	-	-	-
0242	881.4	3.1×10^{-2}	-	168	75	8.24	7.70	-	-	-	3	-	-	-	-	-	-	-	-
0243	875.8	3.2×10^{-2}	-	192	185	8.95	8.39	-	-	-	3	-	-	-	-	-	-	-	-
0244	873.4	3.6×10^{-2}	-	240	75	8.71	-	49.3	-	-	-	0.16	6.67	0.01	2.2×10^{-6}	8.9×10^{-7}	-	2.3×10^{-7}	-
0245	892.8	1.3×10^{-2}	-	168	75	7.44	4.65	48.3	3.59	2.0×10^{-5}	-	0.11	0	-	$<10^{-6}$	1.2×10^{-7}	-	-	-
0246	867.7	4.0×10^{-2}	-	216	131	8.78	-	-	-	-	3	-	-	-	-	-	-	-	-
0247	896.4	2.2×10^{-2}	-	528	178	7.89	6.11	49.7	3.52	2.1×10^{-5}	1	0.34	0	-	$<10^{-6}$	9.3×10^{-8}	-	-	-
0248	895.7	1.3×10^{-2}	-	528	178	7.10	6.24	49.2	3.49	2.0×10^{-5}	-	0.33	0	-	$<10^{-6}$	1.4×10^{-7}	-	-	-
0249	880.9	2.9×10^{-2}	-	192	185	7.89	6.93	50.4	3.98	3.8×10^{-5}	-	0.07	0.0	-	1.3×10^{-5}	-	-	1.1×10^{-6}	-
0250	882.5	3.0×10^{-2}	-	540	72	8.21	-	49.8	4.09	-	-	0.16	13.3	0.02	3.7×10^{-5}	-	-	2.7×10^{-5}	-
0251	875.5	4.1×10^{-2}	-	240	72	8.35	-	50.1	4.43	-	-	0.22	5.0	0.01	6.4×10^{-6}	6.3×10^{-7}	-	8.3×10^{-7}	-

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Table 3.1.19 (Continued)

Short End Plugs (2nd Delivery)

No.	Original			First Impregnation								Second Impregnation						3rd Impr.	
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Polym.-Content %	Carbon Yield %	Sec. Carb. Cont. %	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin-Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeability, $cm^2\ sec^{-1}$ (Press.Dec.)	Permeability, $cm^2\ sec^{-1}$ (Vac.Dec.)	Remarks	Permeab. $cm^2\ sec^{-1}$ (Vac.Dec.)	Remarks
0252	896.6	1.3×10^{-2}	-	192	185	6.39	5.38	50.1	3.20	2.7×10^{-5}	-	0.62	5.3	0.03	1.9×10^{-6}	3.2×10^{-7}	-	-	-
0253	882.8	3.5×10^{-2}	-	528	178	8.56	7.46	51.7	4.43	4.1×10^{-5}	1	0.16	-	-	-	-	3	-	-
0254	882.5	3.2×10^{-2}	-	528	178	8.16	7.14	50.4	4.11	5.3×10^{-5}	-	0.24	0	-	7.7×10^{-6}	4.5×10^{-6}	-	1.9×10^{-5}	-
0255	894.0	1.4×10^{-2}	-	528	178	7.34	6.30	49.2	3.61	2.4×10^{-5}	-	0.31	0	-	$<10^{-6}$	1.7×10^{-7}	-	-	-
0256	871.6	4.5×10^{-2}	-	216	252	8.93	8.27	51.0	4.55	2.1×10^{-4}	-	0.19	-	-	-	-	3	-	-
0257	881.0	3.9×10^{-2}	-	168	75	8.41	7.87	-	-	-	2	-	-	-	-	-	-	-	-
0258	879.2	4.7×10^{-2}	-	216	131	8.82	7.74	50.6	4.46	6.4×10^{-5}	-	0.20	0	-	2.0×10^{-5}	-	-	1.7×10^{-5}	-
0259	878.6	4.1×10^{-2}	-	216	131	8.53	8.00	51.1	4.36	7.5×10^{-5}	-	0.22	0	-	$<10^{-6}$	6.2×10^{-7}	-	1.1×10^{-6}	-
0260	877.7	4.1×10^{-2}	-	168	75	8.83	8.29	-	-	-	2	-	-	-	-	-	-	-	-
0261	878.9	3.5×10^{-2}	-	240	72	9.39	-	49.9	4.19	-	-	0.15	28.6	0.03	1.4×10^{-6}	1.4×10^{-6}	-	4.5×10^{-7}	-
0262	883.4	2.4×10^{-2}	-	216	252	8.57	7.99	50.6	4.43	5.1×10^{-5}	-	0.04	0	-	$<10^{-6}$	7.8×10^{-8}	-	-	-
0263	883.0	2.9×10^{-2}	-	240	72	8.07	-	49.7	4.01	4.0×10^{-4}	-	0.14	0	-	$<10^{-6}$	5.2×10^{-7}	-	3.6×10^{-7}	-
0264	875.6	3.7×10^{-2}	-	528	178	8.83	8.09	51.6	-	-	2	-	-	-	-	-	-	-	-
0265	874.1	4.3×10^{-2}	-	168	75	8.82	8.22	-	-	-	2	-	-	-	-	-	-	-	-
0266	880.2	4.1×10^{-2}	-	192	185	8.41	7.85	-	-	-	2	-	-	-	-	-	-	-	-
0267	882.3	3.3×10^{-2}	-	192	185	7.88	6.97	50.7	4.00	4.4×10^{-5}	-	0.13	0	-	5.3×10^{-6}	3.0×10^{-6}	-	1.0×10^{-6}	-
0268	880.1	3.8×10^{-2}	-	528	178	8.68	7.68	51.6	4.48	1.3×10^{-4}	-	0.18	0	-	$<10^{-6}$	4.8×10^{-7}	-	-	-
0269	863.2	3.8×10^{-2}	-	216	131	9.14	7.89	51.1	4.67	1.8×10^{-4}	-	0.22	-	-	-	-	3	-	-
0270	884.1	3.2×10^{-2}	-	528	178	8.08	7.41	51.6	4.17	2.4×10^{-5}	-	0.02	0	-	$<10^{-6}$	3.2×10^{-7}	-	-	-
0271	897.8	1.3×10^{-2}	-	240	72	6.79	-	50.2	3.41	-	-	0.08	0	-	$<10^{-6}$	9.3×10^{-8}	-	-	-
0272	891.8	1.4×10^{-2}	-	168	75	7.97	7.51	-	-	-	2	-	-	-	-	-	-	-	-
0273	870.9	3.3×10^{-2}	-	216	252	8.74	8.13	51.3	4.48	1.2×10^{-4}	-	0.30	-	-	$<10^{-6}$	7.0×10^{-7}	-	7.3×10^{-7}	-
0274	880.8	3.8×10^{-2}	-	168	75	8.54	8.03	50.0	4.02	5.7×10^{-5}	-	0.07	0	-	8.9×10^{-6}	9.8×10^{-6}	-	1.4×10^{-7}	-
0275	881.5	2.6×10^{-2}	-	240	72	7.76	-	46.3	3.59	-	-	0.14	0	-	$<10^{-6}$	8.1×10^{-7}	-	1.2×10^{-7}	-
0276	884.3	2.4×10^{-2}	-	192	185	7.81	7.29	-	-	-	2	-	-	-	-	-	-	-	-
0277	884.3	3.3×10^{-2}	-	216	131	8.14	7.09	50.7	4.13	6.5×10^{-5}	-	0.18	0	-	2.5×10^{-5}	-	-	5.9×10^{-8}	-
0278	857.3	3.9×10^{-2}	-	168	75	9.44	8.83	-	-	-	2	-	-	-	-	-	-	-	-
0279	881.9	3.5×10^{-2}	-	192	185	8.22	7.68	50.2	4.13	4.0×10^{-5}	-	0.11	0	-	$<10^{-6}$	3.0×10^{-7}	-	-	-
0280	879.2	2.8×10^{-2}	-	216	252	8.47	7.88	50.7	4.30	1.0×10^{-4}	-	0.26	0	-	2.0×10^{-5}	-	-	1.2×10^{-5}	-

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Table 3.1.20

Short End Plugs (5th Delivery)

No.	Original			First Impregnation							Second Impregnation						3rd Impr.	
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeab. (Press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeability, $cm^2 sec^{-1}$ (Press.Dec.)	(Vac. Dec.)	Remarks	Permeab. $cm^2\ sec^{-1}$ (Vac.Dec.)	Remarks
0338	870.0	4.1×10^{-2}	-	108	133	8.40	51.3	4.31	-	-	0.22	0	-	6.4×10^{-6}	6.2×10^{-7}	-	1.5×10^{-6}	-
0339	873.9	4.0×10^{-2}	-	132	124	8.96	50.9	4.56	-	-	0.31	14.3	0.04	$< 10^{-6}$	1.2×10^{-7}	-	-	-
0340	871.5	3.3×10^{-2}	-	132	124	9.12	47.7	4.55	-	-	0.22	5.0	0.01	6.4×10^{-6}	1.6×10^{-6}	-	5.9×10^{-7}	-
0341	860.5	7.6×10^{-2}	-	108	133	9.89	50.9	5.03	-	-	0.27	0	-	8.0×10^{-6}	7.1×10^{-7}	-	4.0×10^{-6}	-
0342	872.1	4.4×10^{-2}	-	132	124	8.04	50.1	4.01	-	-	0.19	5.9	0.01	1.0×10^{-5}	-	-	1.7×10^{-7}	-
0343	871.0	4.9×10^{-2}	-	132	124	9.51	51.6	4.91	-	-	0.14	0	-	2.2×10^{-4}	-	-	2.4×10^{-5}	-
0344	862.8	7.3×10^{-2}	-	159	190	8.03	49.8	4.00	-	-	0.30	18.5	0.06	2.8×10^{-5}	-	-	4.5×10^{-6}	-
0345	858.9	7.3×10^{-2}	-	108	133	10.44	51.9	5.42	-	-	0.15	-	-	6.4×10^{-6}	1.8×10^{-6}	-	7.4×10^{-6}	-
0346	869.4	4.6×10^{-2}	-	108	133	7.95	50.5	4.01	-	-	0.17	13.3	0.02	$< 10^{-6}$	9.9×10^{-8}	-	-	-
0347	869.7	3.6×10^{-2}	-	108	133	9.31	52.6	4.84	-	-	0.26	8.33	0.02	6.4×10^{-6}	4.7×10^{-7}	-	-	-
0348	869.9	4.2×10^{-2}	-	108	133	8.92	50.5	4.50	-	-	0.29	26.9	0.08	8.0×10^{-6}	6.7×10^{-7}	-	1.9×10^{-7}	-
0349	862.0	3.8×10^{-2}	-	132	124	9.84	50.7	4.99	-	-	0.31	21.4	0.07	8.0×10^{-6}	3.9×10^{-7}	-	-	-
0350	870.1	4.7×10^{-2}	-	108	133	9.33	51.6	4.81	-	-	0.22	0	-	1.0×10^{-5}	-	-	2.0×10^{-6}	-
0351	868.6	3.8×10^{-2}	-	108	133	7.77	52.0	4.04	-	-	0.51	0	-	3.2×10^{-6}	3.7×10^{-7}	-	-	-
0352	866.5	4.5×10^{-2}	-	108	133	7.97	50.2	4.00	-	-	0.26	30.4	0.08	$< 10^{-6}$	1.8×10^{-7}	-	-	-
0353	872.2	4.4×10^{-2}	-	132	124	8.21	50.2	4.12	-	-	0.21	0	-	3.3×10^{-5}	-	-	2.1×10^{-7}	-
0354	867.5	4.2×10^{-2}	-	132	124	9.86	49.7	4.90	-	-	0.26	20.8	0.05	3.2×10^{-6}	4.2×10^{-7}	-	-	-
0355	868.8	3.7×10^{-2}	-	108	133	6.19	65.8	4.07	-	-	0.49	6.8	0.03	3.2×10^{-6}	4.9×10^{-7}	-	-	-
0356	871.2	5.5×10^{-2}	-	108	133	8.67	50.7	4.39	-	-	0.40	19.4	0.08	5.7×10^{-6}	4.7×10^{-7}	-	-	-
0357	864.6	4.3×10^{-2}	-	132	124	9.93	51.4	5.10	-	-	0.30	13.7	0.04	8.0×10^{-6}	1.1×10^{-6}	-	3.4×10^{-6}	-
0358	863.4	6.2×10^{-2}	-	132	124	8.96	50.0	4.48	4.6×10^{-4}	-	0.34	9.7	0.03	8.0×10^{-6}	6.4×10^{-7}	-	9.5×10^{-8}	-
0359	879.6	5.1×10^{-2}	-	132	124	7.11	41.9	2.98	2.9×10^{-4}	-	0.19	0	-	4.8×10^{-5}	-	-	1.0×10^{-7}	-
0360	868.1	4.7×10^{-2}	-	108	133	8.05	51.4	4.14	-	-	0.30	18.5	0.06	$< 10^{-6}$	1.8×10^{-7}	-	-	-
0361	866.7	4.1×10^{-2}	-	132	124	8.61	50.0	4.30	-	-	0.22	0	-	4.8×10^{-6}	3.6×10^{-7}	-	-	-
0362	868.4	2.9×10^{-2}	-	132	124	7.81	50.0	3.90	-	-	0.22	20.0	0.04	4.8×10^{-6}	3.3×10^{-7}	-	-	-
0363	868.4	4.6×10^{-2}	-	108	133	8.54	51.8	4.42	2.4×10^{-4}	-	0.19	29.4	0.06	1.6×10^{-6}	1.1×10^{-7}	-	1.1×10^{-5}	-
0364	873.5	4.2×10^{-2}	-	132	124	8.94	51.1	4.57	-	-	0.24	18.2	0.05	4.8×10^{-6}	4.9×10^{-7}	-	-	-
0365	876.0	4.4×10^{-2}	-	132	124	8.97	51.8	4.65	-	-	0.25	0	-	9.6×10^{-6}	2.1×10^{-6}	-	5.3×10^{-6}	-

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Table 3.1.20 (Continued)

Short End Plugs (5th Delivery)

No.	Original			First Impregnation							Second Impregnation						3rd Impr.	
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeab. (Press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin-Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeability, $cm^2\ sec^{-1}$ (Press.Dec.)	(Vac. Dec.)	Remarks	Permeab. $cm^2\ sec^{-1}$ (Vac.Dec.)	Remarks
0366	873.9	4.5×10^{-2}	-	108	133	8.10	51.9	4.20	-	-	0.53	2.1	0.01	7.1×10^{-6}	6.8×10^{-7}	-	8.4×10^{-7}	-
0368	873.9	3.9×10^{-2}	-	132	124	8.01	50.0	4.00	-	-	0.25	0	-	3.2×10^{-6}	3.9×10^{-7}	-	-	-
0369	878.0	3.6×10^{-2}	-	108	133	7.71	50.5	3.89	1.2×10^{-4}	-	0.24	13.6	0.03	9.6×10^{-6}	5.1×10^{-7}	-	2.7×10^{-7}	-
0370	874.4	3.5×10^{-2}	-	132	124	7.65	49.7	3.79	8.3×10^{-5}	-	0.15	0	-	3.2×10^{-6}	2.9×10^{-7}	-	-	-
0371	862.0	6.0×10^{-2}	-	132	124	10.08	51.5	5.19	-	-	0.39	17.1	0.07	6.4×10^{-6}	3.0×10^{-6}	-	1.1×10^{-7}	-
0372	871.5	3.1×10^{-2}	-	132	124	7.81	50.5	3.94	-	-	0.11	0	-	3.2×10^{-6}	1.0×10^{-7}	-	-	-
0373	872.1	5.0×10^{-2}	-	108	133	9.48	51.1	4.84	-	-	0.22	70	0.15	$< 10^{-6}$	1.0×10^{-7}	-	-	-
0374	864.5	3.8×10^{-2}	-	132	124	9.86	50.8	5.01	-	-	0.34	19.4	0.07	6.4×10^{-6}	6.0×10^{-7}	-	2.7×10^{-6}	-
0375	869.6	5.1×10^{-2}	-	108	133	9.55	52.3	4.99	-	-	0.22	0	-	2.4×10^{-5}	-	-	2.0×10^{-6}	-
0376	870.9	4.4×10^{-2}	-	108	133	8.90	48.5	4.32	-	-	0.25	0	-	3.2×10^{-6}	2.0×10^{-7}	-	-	-
0377	872.7	3.8×10^{-2}	-	108	133	7.89	50.6	3.99	-	-	0.28	40.0	0.11	1.0×10^{-5}	-	-	7.2×10^{-7}	-
0378	874.1	4.3×10^{-2}	-	132	124	9.15	51.1	4.68	-	-	0.27	0	-	6.4×10^{-6}	8.9×10^{-7}	-	1.7×10^{-7}	-
0379	868.5	4.4×10^{-2}	-	108	133	9.41	51.4	4.84	-	-	0.19	0	-	3.8×10^{-5}	-	-	1.0×10^{-6}	-
0380	868.7	crack on receipt																

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Table 3.1.21

Short End Plugs (7th Delivery)

No.	Original			First Impregnation							Second Impregnation						3rd Impr.	
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin-Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeability, $cm^2\ sec^{-1}$ (Press.Dec.)	(Vac. Dec.)	Remarks	Permeab. $cm^2\ sec^{-1}$ (Vac.Dec.)	Remarks
0636	871.1	2.7×10^{-2}	-	168	110.0	8.49	51.6	4.38	-	-	0.08	0	-	6.4×10^{-6}	3.0×10^{-6}	-	4.4×10^{-6}	-
0637	882.8	4.3×10^{-2}	-	168	110.0	6.27	48.9	3.07	-	-	0.10	0	-	6.4×10^{-6}	2.2×10^{-6}	-	1.3×10^{-6}	-
0638	875.8	2.3×10^{-2}	-	168	110.0	8.33	53.1	4.42	-	-	0.10	0	-	8.0×10^{-6}	2.5×10^{-6}	-	8.0×10^{-7}	-
0639	884.8	1.6×10^{-2}	-	168	110.0	6.74	49.7	3.35	-	-	0.09	0	-	8.0×10^{-6}	2.8×10^{-6}	-	7.5×10^{-7}	-
0640	879.7	1.6×10^{-2}	-	120	123.8	6.38	50.4	3.27	-	-	0.05	0	-	$<10^{-6}$	1.6×10^{-7}	-	-	-
0641	881.7	2.4×10^{-2}	-	120	123.8	7.68	51.8	3.98	3.8×10^{-5}	-	0.11	0	-	$<10^{-6}$	2.3×10^{-7}	-	-	-
0642	898.9	5.7×10^{-3}	-	120	123.8	4.33	49.9	2.16	-	-	0.08	42.9	0.03	4.8×10^{-6}	2.5×10^{-6}	-	3.8×10^{-7}	-
0643	886.3	1.6×10^{-2}	-	168	110.0	6.98	49.4	3.45	-	-	0.05	0	-	1.2×10^{-5}	-	-	1.3×10^{-5}	-
0644	873.5	2.7×10^{-2}	-	120	123.8	7.98	51.2	4.09	-	-	0.11	0	-	1.6×10^{-6}	4.7×10^{-6}	-	7.7×10^{-7}	-
0645	882.0	1.9×10^{-2}	-	144	85.0	6.92	51.3	3.55	4.8×10^{-5}	-	0.15	50.0	0.08	8.0×10^{-6}	7.6×10^{-7}	-	-	-
0646	882.6	1.8×10^{-2}	-	159	95.0	6.81	49.7	3.38	-	-	0.09	25.0	0.02	3.2×10^{-6}	7.3×10^{-7}	-	-	-
0647	878.0	2.4×10^{-2}	-	168	110.0	7.21	51.0	3.68	-	-	0.79	30.5	0.24	1.3×10^{-5}	-	-	7.8×10^{-6}	-
0649	871.0	2.9×10^{-2}	-	168	110.0	8.74	50.5	4.41	-	-	0.30	3.7	0.01	8.0×10^{-6}	5.3×10^{-6}	-	2.7×10^{-6}	-
0650	882.4	1.3×10^{-2}	-	120	123.8	5.92	49.4	2.92	-	2	-	-	-	-	-	-	-	-
0651	879.4	1.8×10^{-2}	-	144	85.0	6.87	51.6	3.54	-	-	0.11	40.8	0.04	1.6×10^{-6}	7.6×10^{-7}	-	-	-
0652	884.0	1.3×10^{-2}	-	168	110.0	6.74	48.8	3.29	-	-	0.12	0	-	8.0×10^{-6}	1.8×10^{-6}	-	7.1×10^{-7}	-
0653	882.4	1.5×10^{-2}	-	168	110.0	7.65	53.0	4.05	-	-	0.03	0	-	1.1×10^{-5}	-	-	1.3×10^{-5}	-
0654	872.0	2.5×10^{-2}	-	144	85.0	7.41	51.4	3.81	-	-	0.25	43.5	0.11	8.0×10^{-6}	1.2×10^{-6}	-	1.1×10^{-6}	-
0655	875.8	2.4×10^{-2}	-	168	110.0	8.25	52.3	4.31	-	-	0.05	0	-	6.4×10^{-6}	1.3×10^{-6}	-	2.5×10^{-6}	-
0656	874.8	2.2×10^{-2}	-	120	123.8	7.80	52.3	4.08	-	-	0.11	0	-	$<10^{-6}$	1.5×10^{-7}	-	-	-
0657	876.1	2.2×10^{-2}	-	120	123.8	7.27	51.0	3.71	-	-	0.04	0	-	$<10^{-6}$	3.8×10^{-7}	-	-	-
0658	873.0	2.3×10^{-2}	-	168	110.0	7.74	51.5	3.99	-	-	0.11	0	-	8.0×10^{-6}	2.2×10^{-6}	-	1.7×10^{-6}	-
0659	875.0	2.3×10^{-2}	-	168	110.0	7.41	53.9	3.99	1.1×10^{-4}	-	0.08	14.3	0.01	4.8×10^{-6}	6.1×10^{-7}	-	-	-
0660	873.8	2.3×10^{-2}	-	144	85.0	8.42	51.1	4.30	-	-	0.11	30.0	0.03	8.0×10^{-6}	7.6×10^{-7}	-	-	-
0661	877.0	2.5×10^{-2}	-	144	85.0	7.06	50.9	3.59	1.4×10^{-4}	-	0.11	50.0	0.06	1.2×10^{-5}	-	-	2.0×10^{-6}	-
0662	872.9	2.0×10^{-2}	-	168	110.0	7.73	50.8	3.93	-	-	0.12	0	-	1.3×10^{-5}	-	-	6.4×10^{-7}	-
0663	874.3	2.2×10^{-2}	-	168	110.0	7.95	53.4	4.24	-	-	0.12	0	0	6.4×10^{-6}	1.7×10^{-6}	-	1.6×10^{-6}	-

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Table 3.1.21 (Continued)

Short End Plugs (7^{th} Delivery)-

No.	Original			First Impregnation							Second Impregnation						3rd Impr.	
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin-Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeability, $cm^2\ sec^{-1}$ (Press.Dec.)	(Vac. Dec.)	Remarks	Permeab. $cm^2\ sec^{-1}$ (Vac.Dec.)	Remarks
0664	876.3	2.3×10^{-2}	-	120	123.8	7.27	51.0	3.71	-	-	0.09	37.5	0.03	8.0×10^{-6}	7.9×10^{-7}	-	-	-
0665	883.4	1.1×10^{-2}	-	144	85.0	5.09	50.2	2.55	-	-	0.51	47.8	0.24	8.0×10^{-6}	1.3×10^{-6}	-	7.1×10^{-7}	-
0666	873.7	2.1×10^{-2}	-	120	123.8	7.69	51.8	3.98	-	-	0.99	11.1	0.11	1.6×10^{-6}	2.4×10^{-7}	-	1.1×10^{-7}	-
0667	878.0	2.5×10^{-2}	-	168	110.0	7.73	53.7	4.15	-	-	0.12	9.1	0.01	1.6×10^{-6}	6.1×10^{-6}	-	-	-
0668	885.3	2.5×10^{-2}	-	168	110.0	5.42	49.4	2.68	-	-	0.77	38.6	0.30	8.0×10^{-6}	2.8×10^{-7}	-	1.6×10^{-6}	-
0669	880.2	2.0×10^{-2}	-	168	110.0	7.70	54.1	4.17	-	-	0.11	10.0	0.01	6.4×10^{-6}	4.0×10^{-7}	-	-	-
0670	885.2	1.7×10^{-2}	-	144	85.0	5.75	50.1	2.88	-	-	0.12	27.3	0.03	8.0×10^{-6}	2.3×10^{-6}	-	1.4×10^{-6}	-
0671	884.3	1.6×10^{-2}	-	120	123.9	6.43	52.2	3.36	-	-	0.09	37.5	0.03	8.0×10^{-6}	1.1×10^{-6}	-	1.2×10^{-6}	-
0672	875.0	2.4×10^{-2}	-	168	110.0	8.11	53.2	4.31	-	-	0.11	0	0	9.6×10^{-6}	3.6×10^{-6}	-	9.3×10^{-7}	-
0673	883.0	1.5×10^{-2}	-	168	110.0	4.87	52.8	2.57	-	-	0.07	0	-	6.4×10^{-6}	1.0×10^{-6}	-	1.3×10^{-6}	-
0674	874.5	2.1×10^{-2}	-	144	85.0	7.26	50.4	3.66	-	-	0.09	37.5	0.03	1.4×10^{-5}	-	-	3.8×10^{-6}	-
0675	886.4	1.0×10^{-2}	-	168	110.0	5.69	51.4	2.92	3.5×10^{-5}	-	0.08	0	-	8.0×10^{-6}	1.5×10^{-5}	-	1.7×10^{-6}	-

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Table 3.1.22

Short End Plugs (7th Delivery, Seven Element Rig)

No.	Original			First Impregnation							Second Impregnation						3rd Impr.	
	Weight g	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Pre-polym. Time hrs	Visc. of Impr. cP	Resin-Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeab. (press.dec.) $cm^2\ sec^{-1}$	Remarks	Resin-Uptake %	Carbon Yield %	Sec. Carbon Cont. %	Permeability, $cm^2\ sec^{-1}$ (Press.Dec.)	(Vac. Dec.)	Remarks	Permeab. $cm^2\ sec^{-1}$ (Vac.Dec.)	Remarks
BPs 1	780.6	3.9×10^{-2}	-	159	95.0	3.98	-	-	-	-	0.07	50.0	0.035	4.8×10^{-6}	1.7×10^{-6}	-	-	-
BPs 2	774.1	4.4×10^{-2}	-	159	95.0	7.22	46.9	3.39	-	-	0.10	37.5	0.04	8.0×10^{-6}	5.8×10^{-6}	-	-	-
BPs 3	780.0	3.6×10^{-2}	-	159	95.0	6.47	48.5	3.14	-	-	0.25	45.0	0.11	4.8×10^{-6}	9.3×10^{-7}	-	-	-
BPs 4	774.6	6.2×10^{-2}	-	159	95.0	9.31	51.9	4.83	-	-	0.20	37.5	0.07	3.2×10^{-6}	7.7×10^{-7}	-	-	-
BPs 5	766.3	1.0×10^{-1}	-	159	95.0	9.03	51.2	4.62	7.5×10^{-5}	-	0.24	52.6	0.13	2.4×10^{-5}	-	-	5.7×10^{-6}	-
BPs 6	769.7	6.7×10^{-2}	-	159	95.0	9.80	50.3	4.93	-	-	0.11	0	0	8.0×10^{-6}	7.0×10^{-6}	-	-	-
BPs 7	765.6	6.3×10^{-2}	-	159	95.0	7.47	47.5	4.55	-	-	0.11	66.7	0.07	2.1×10^{-5}	-	-	2.2×10^{-6}	-
BPs 8	780.5	4.0×10^{-2}	-	159	95.0	6.60	48.0	3.17	-	-	0.16	69.2	0.11	2.3×10^{-5}	-	-	1.7×10^{-6}	-
BPs 9	769.1	6.3×10^{-2}	-	159	95.0	8.37	48.4	4.05	-	-	0.10	0	-	3.2×10^{-6}	6.3×10^{-7}	-	-	-
BPs 10	781.7	3.4×10^{-2}	-	159	95.0	6.51	47.5	3.09	-	-	0.09	42.9	0.04	8.0×10^{-6}	1.0×10^{-5}	-	-	-
BPs 11	770.0	6.3×10^{-2}	-	159	95.0	6.96	45.7	3.18	4.5×10^{-4}	-	0.12	60.0	0.07	8.0×10^{-6}	7.7×10^{-6}	-	-	-
BPs 12	774.3	5.2×10^{-2}	-	159	95.0	6.60	48.3	3.19	-	-	0.55	38.6	0.21	1.6×10^{-6}	4.6×10^{-7}	-	-	-
BPs 13	779.0	4.0×10^{-2}	-	159	95.0	7.51	49.2	3.69	-	-	0.19	40.0	0.08	4.8×10^{-6}	2.5×10^{-6}	-	-	-
BPs 14	770.0	5.7×10^{-2}	-	159	95.0	9.48	51.1	4.84	-	-	0.11	44.4	0.05	1.6×10^{-6}	2.2×10^{-6}	-	-	-
BPs 15	773.2	5.8×10^{-2}	-	159	95.0	9.17	51.5	4.72	-	-	0.28	34.8	0.10	3.2×10^{-6}	5.6×10^{-7}	-	-	-
BPs 16	775.1	4.8×10^{-2}	-	159	95.0	9.34	52.1	4.87	4.5×10^{-5}	-	0.21	23.5	0.05	1.6×10^{-6}	5.6×10^{-7}	-	-	-

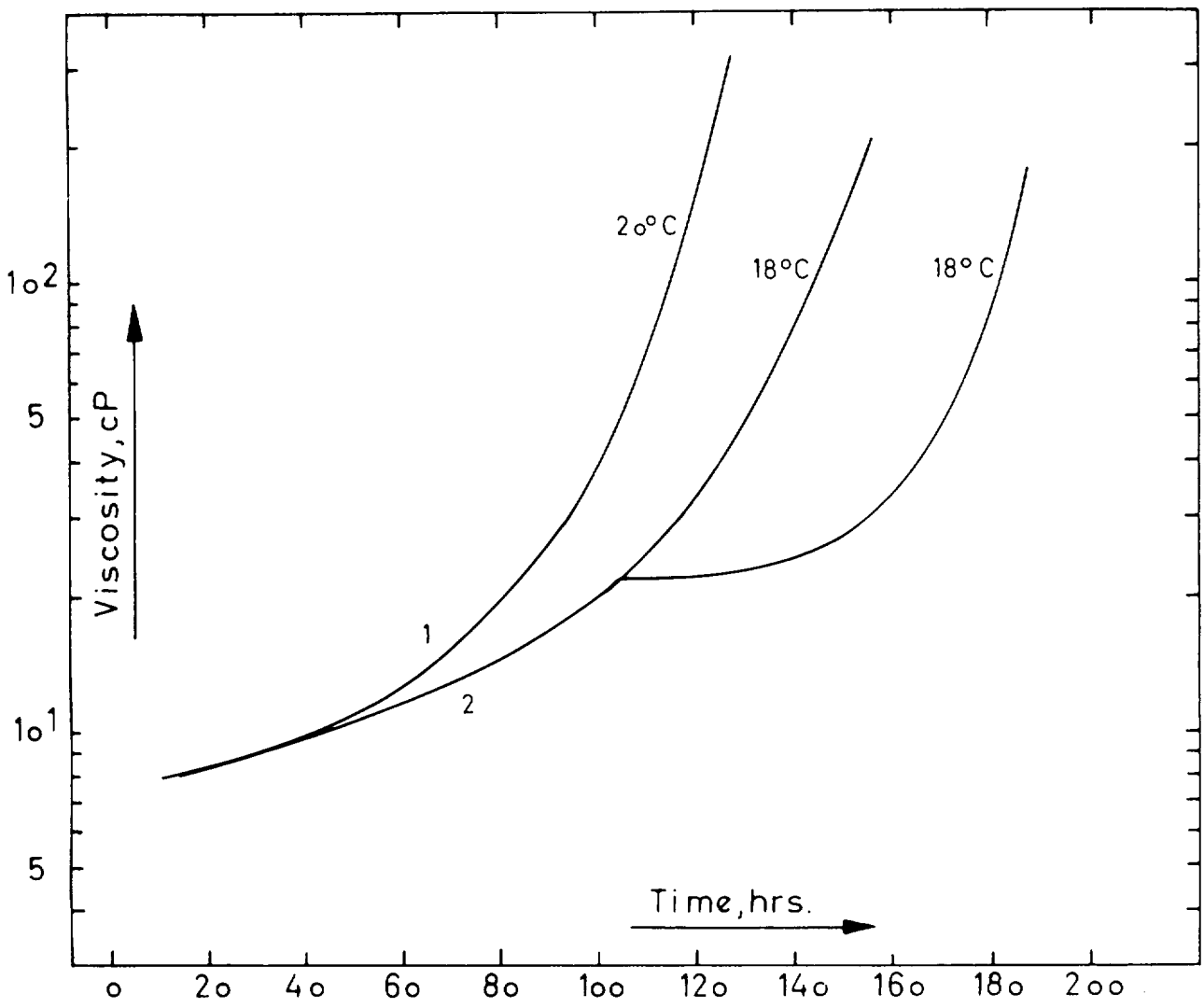


Fig. 2.1

Relation Between Viscosity and Precondensation Time at Various Temperatures

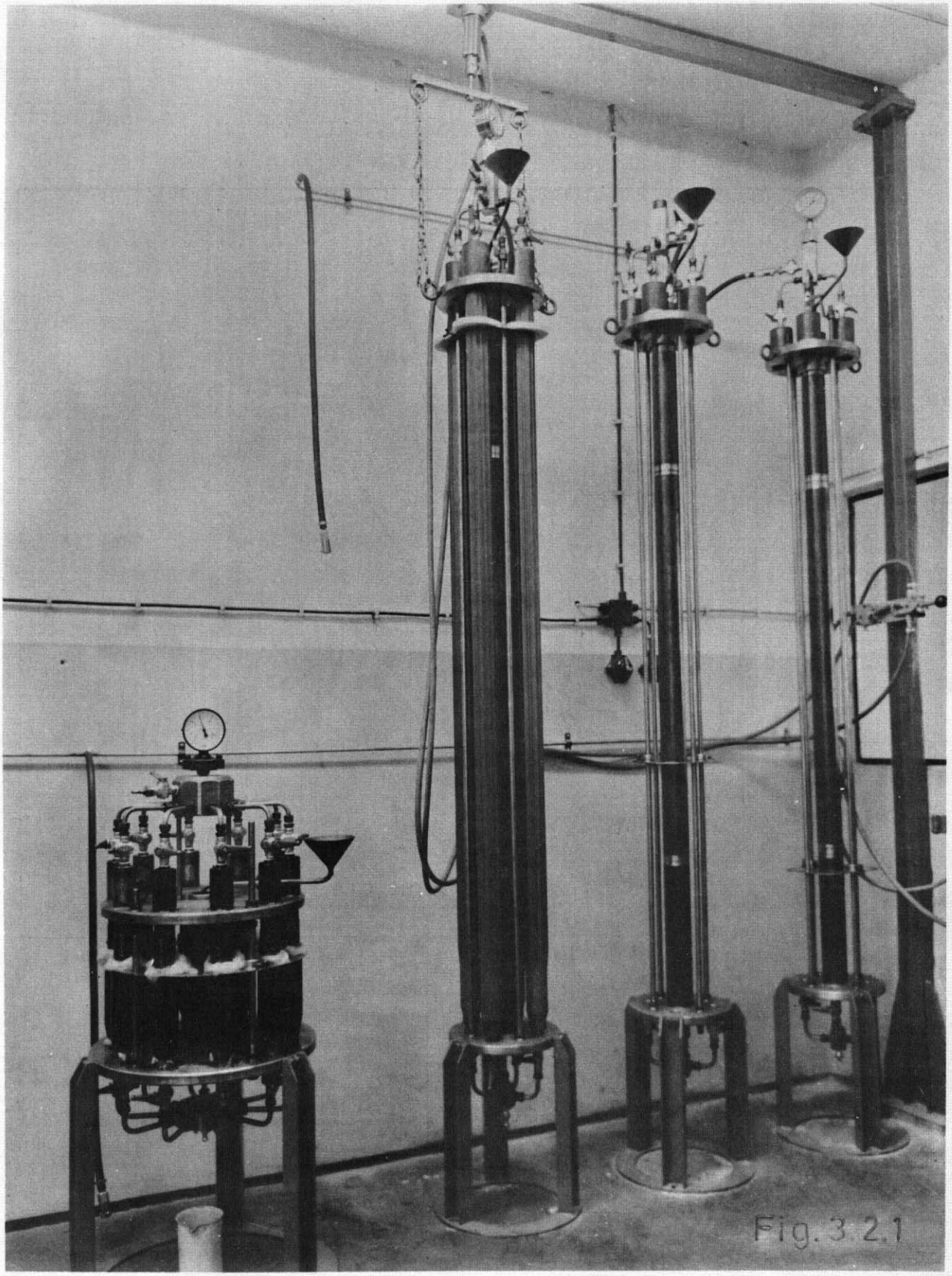


FIG. 3.2.1 CLAMPING DEVICE FOR IMPREGNATION

FIG. 5.1.1 SAGGER WITH FUEL RODS AND CRUCIBLES FOR END PLUGS

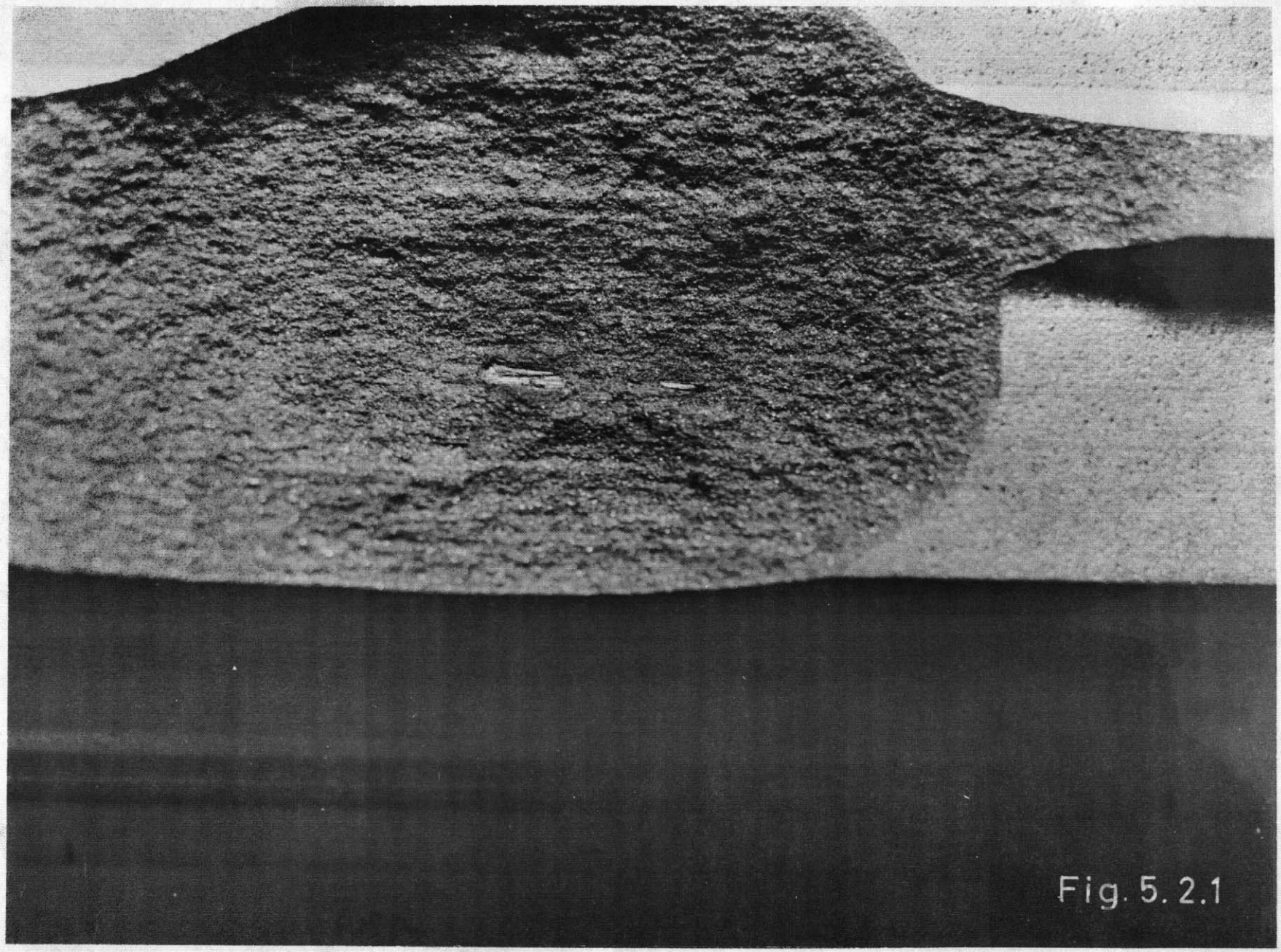


FIG. 5.2.1 SPALLED ROD WITH INCLUSION

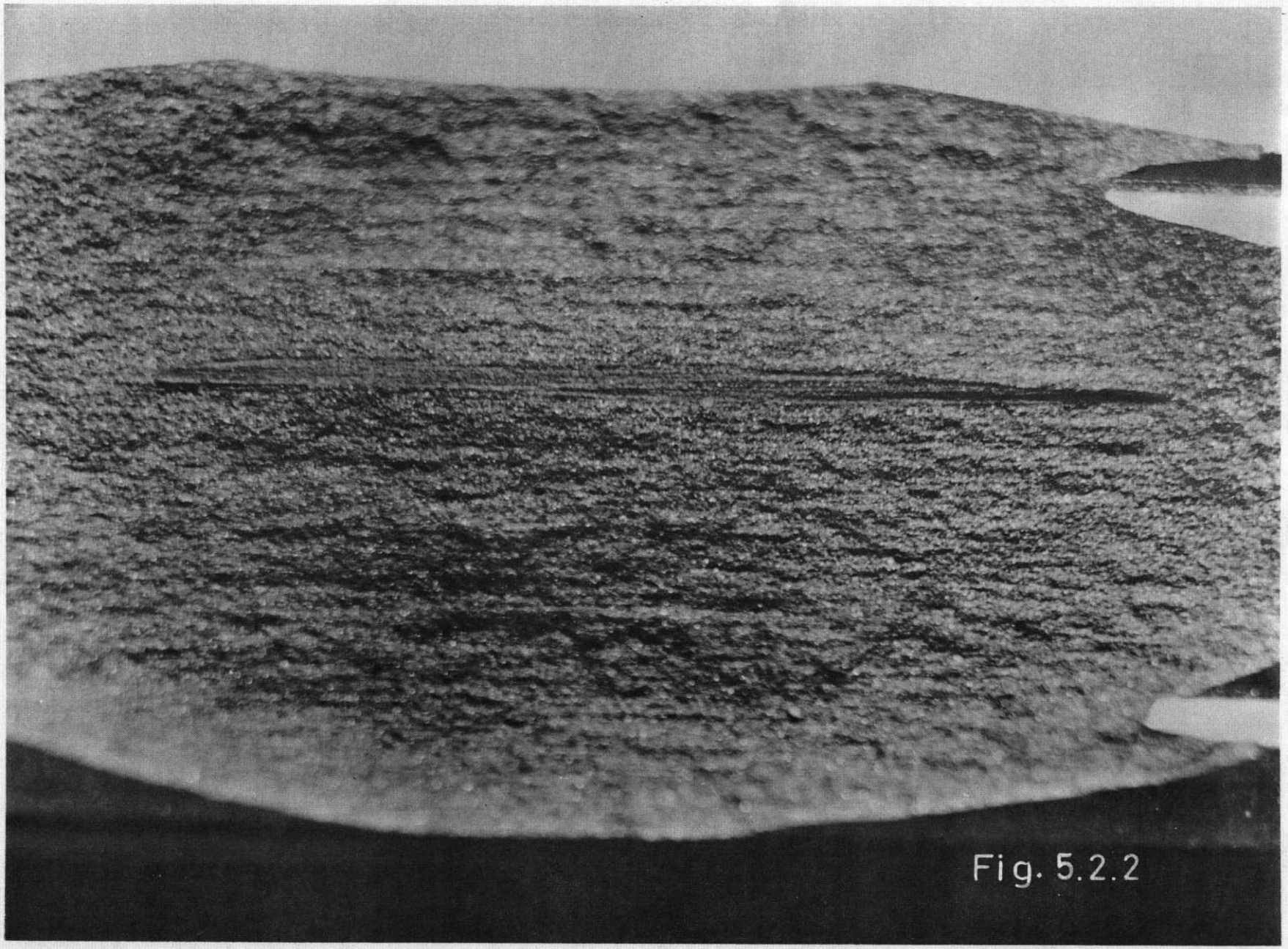


FIG. 5.2.2 SPALLED ROD WITH INCLUSION

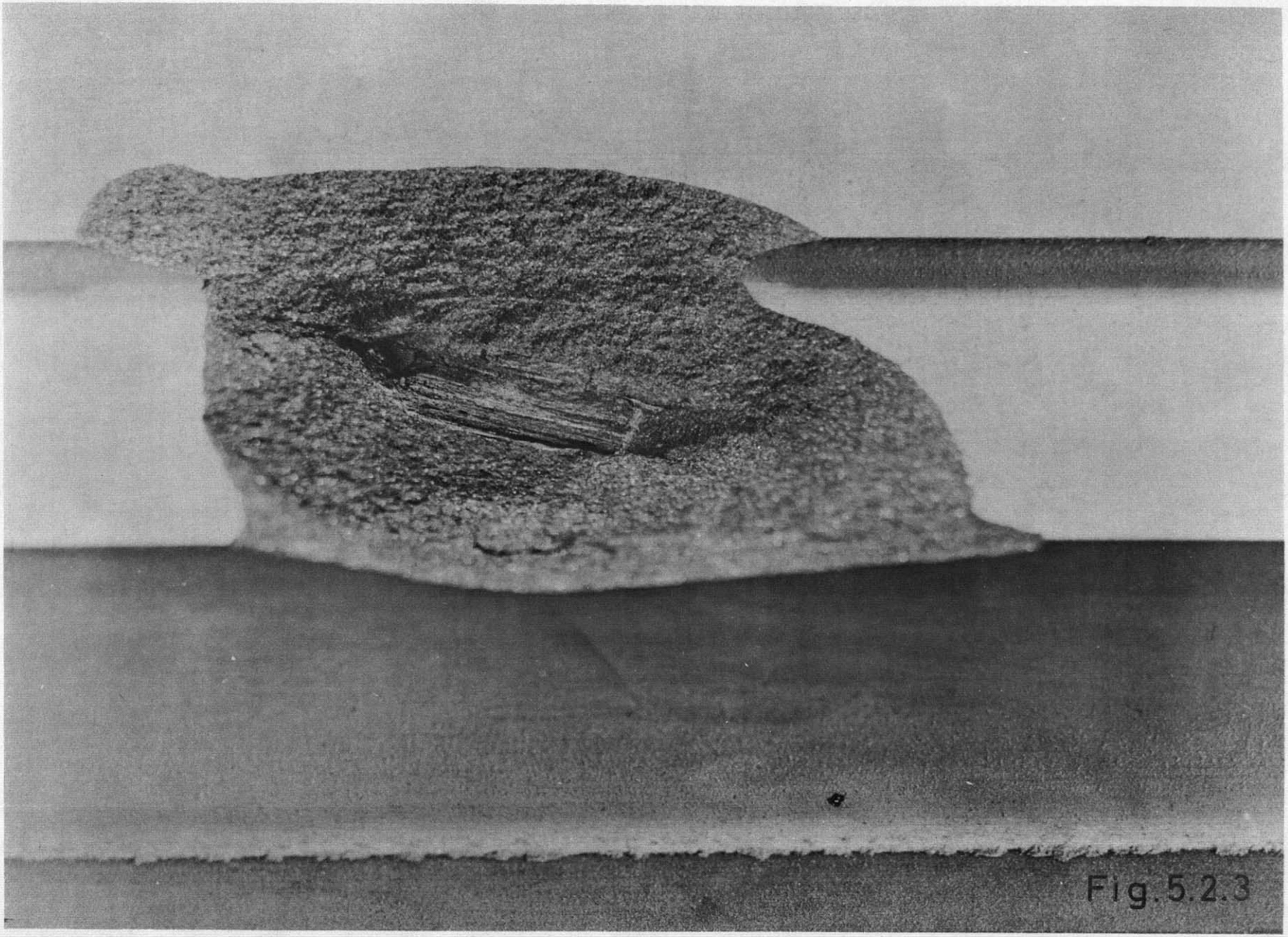


FIG. 5.2.3 SPALLED ROD WITH INCLUSION

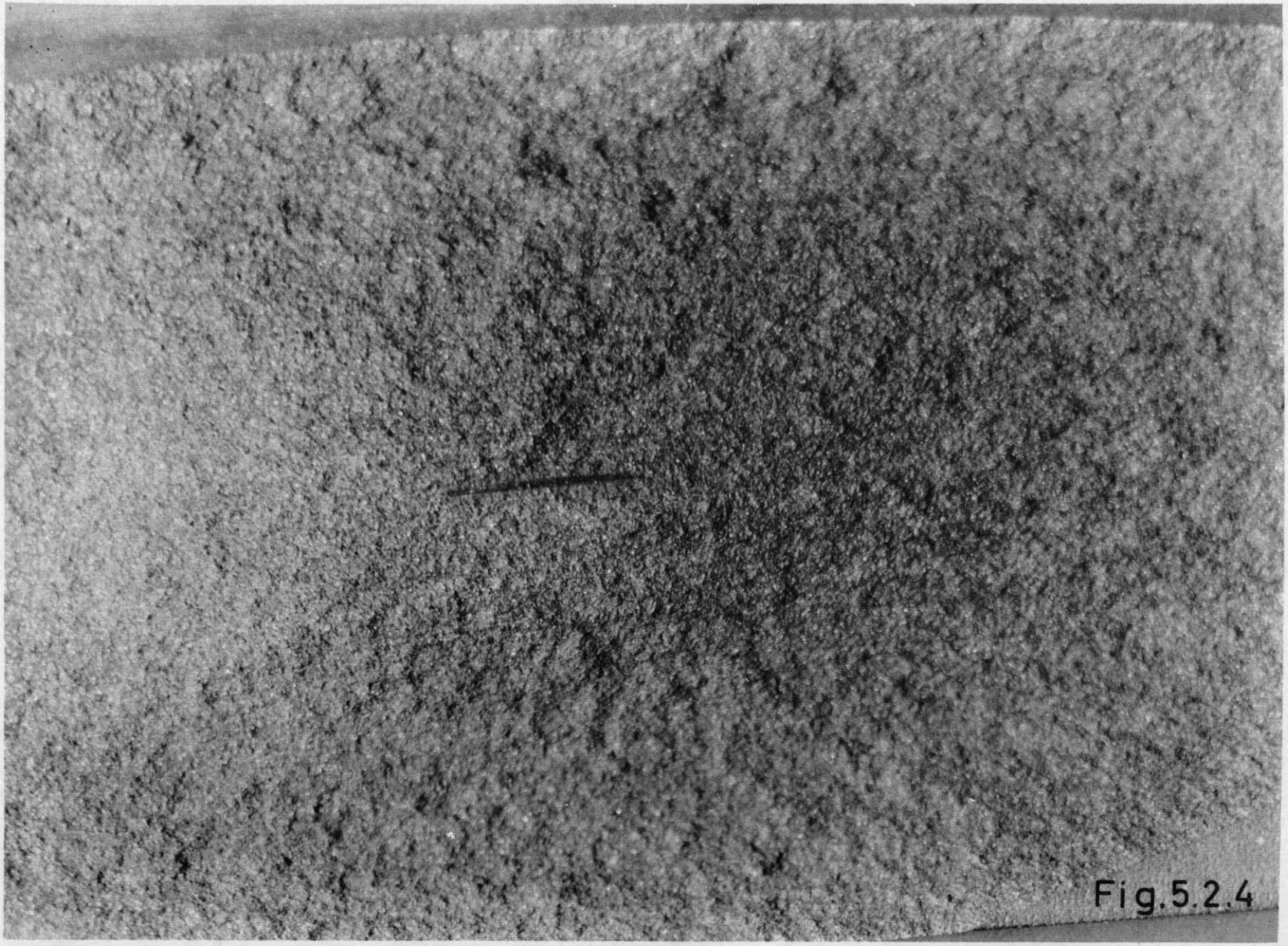


FIG. 5.2.4 SPALLED ROD WITH FAULT

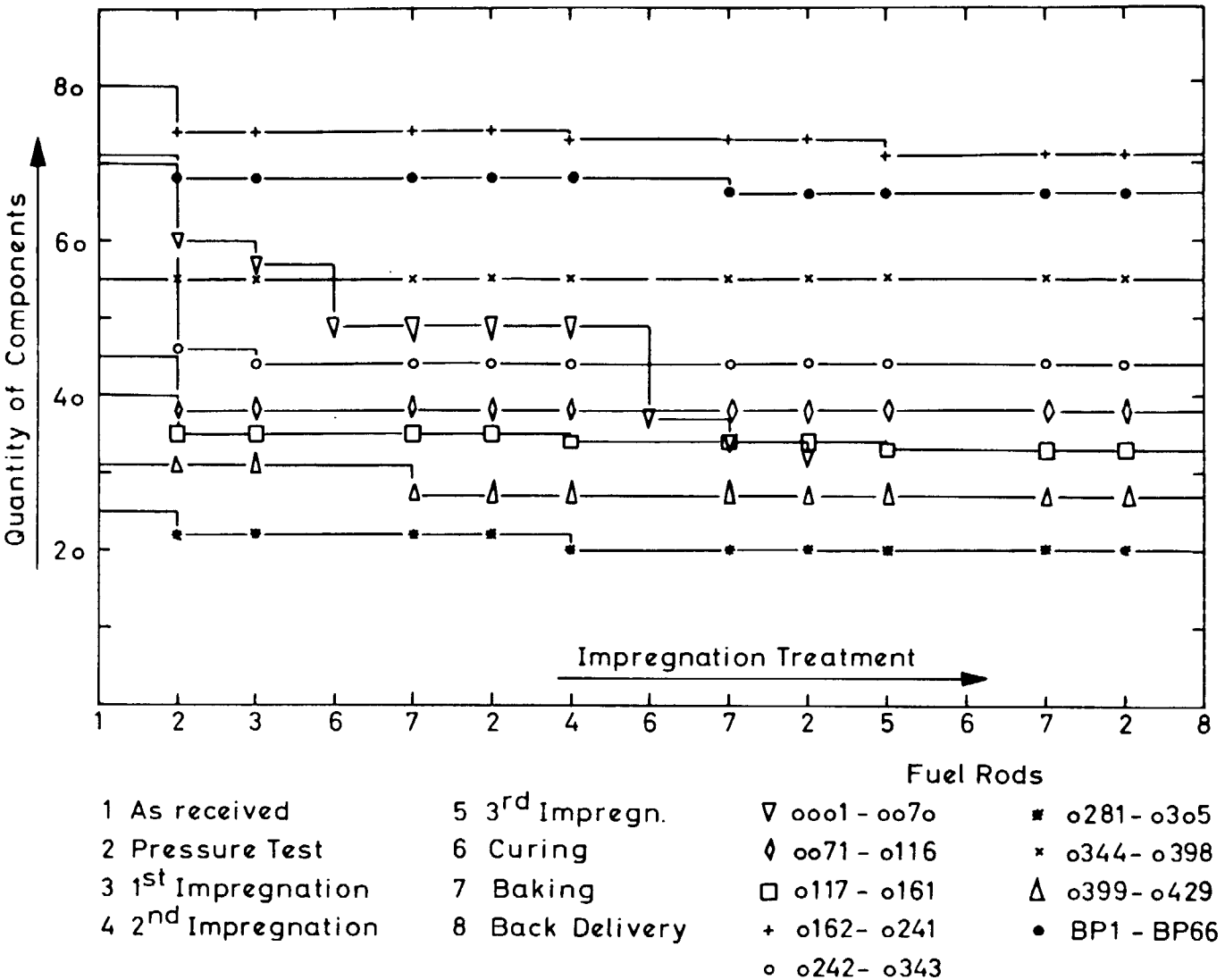


Fig. 5.2.5

Decrease of Specimens During Impregnation Process

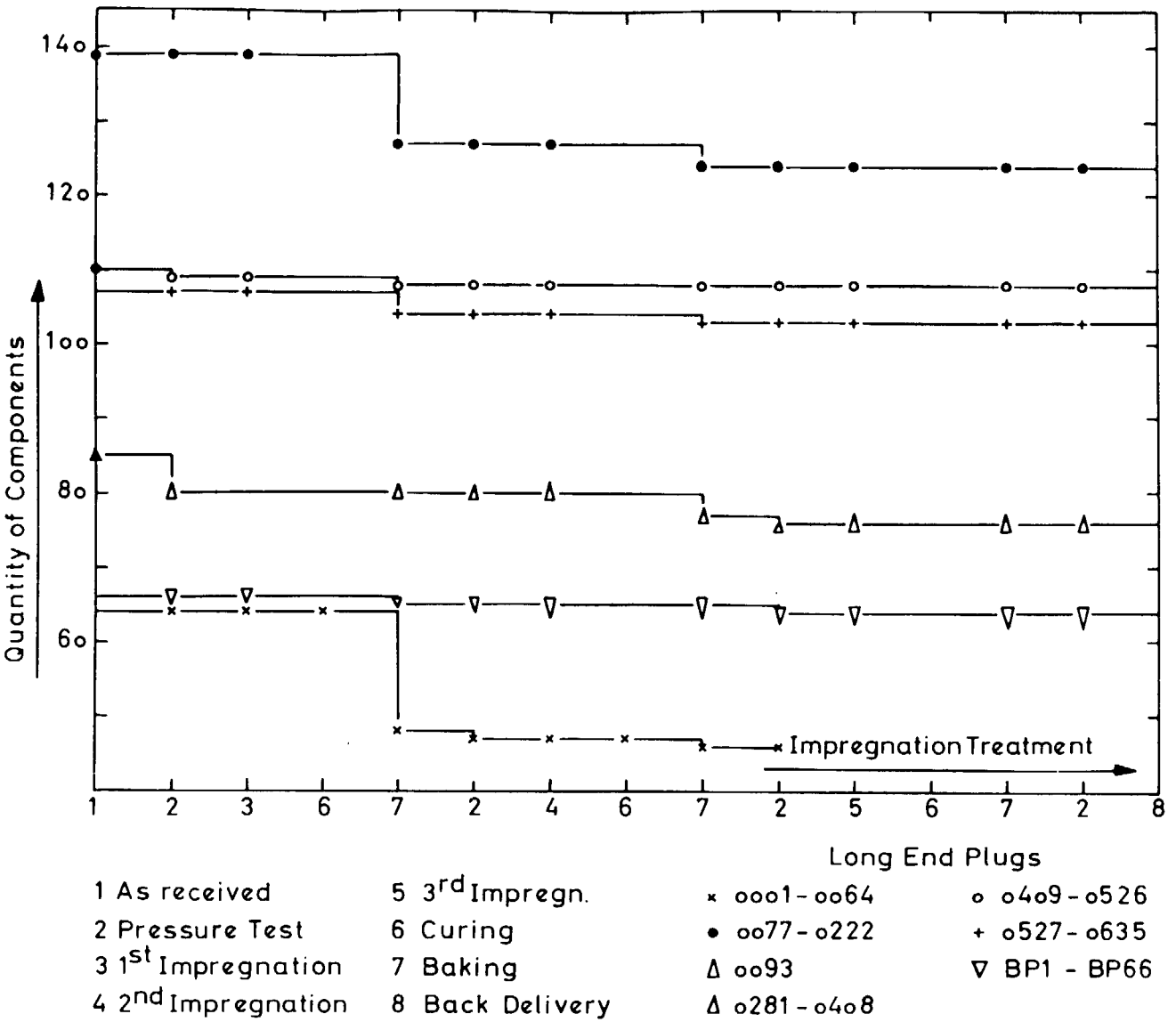


Fig. 5.2.6

Decrease of Specimens During Impregnation Process

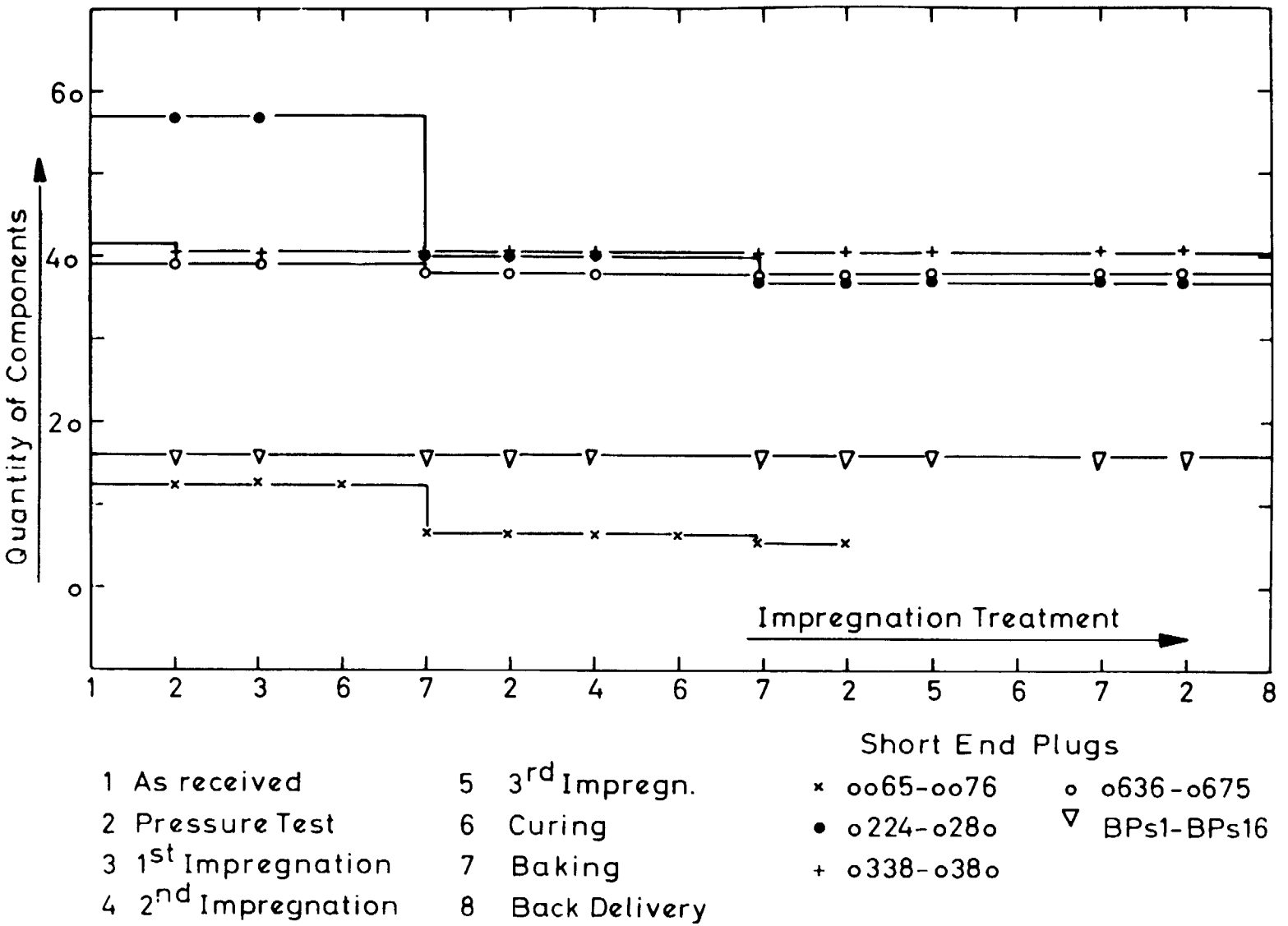


Fig. 5.2.7

Decrease of Specimens During Impregnation Process

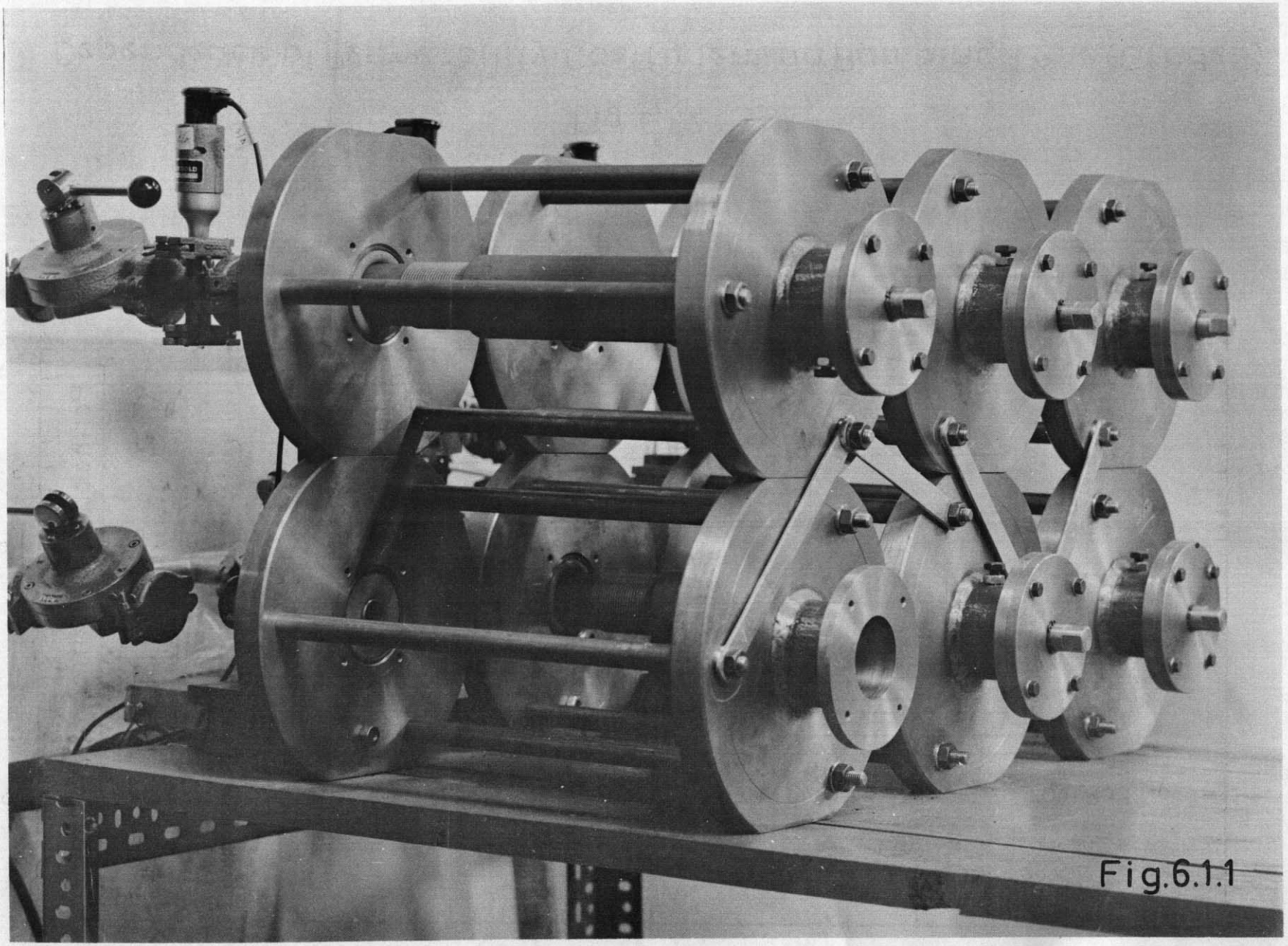


FIG. 6.1.1 APPARATUS FOR PERMEABILITY MEASUREMENT

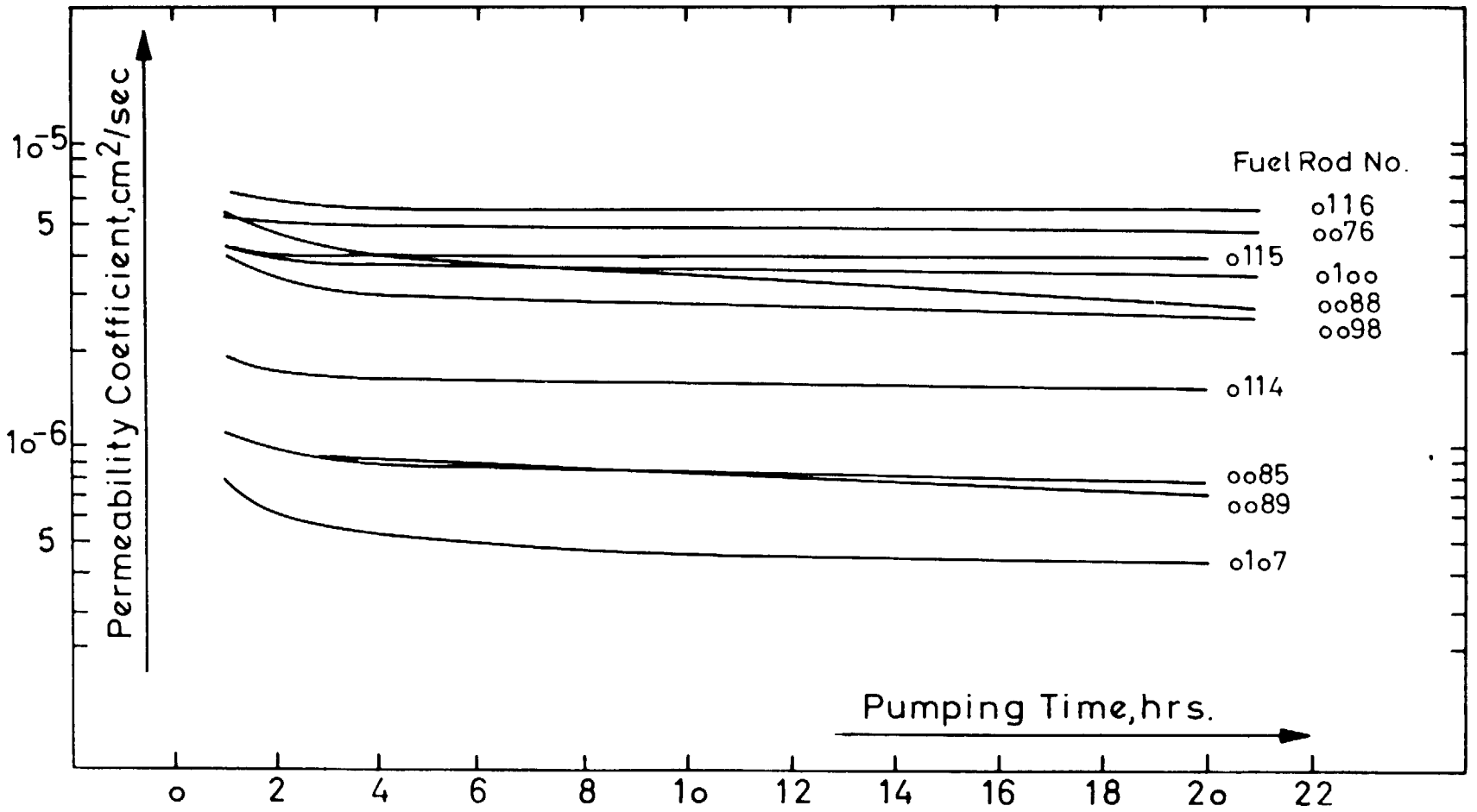


Fig. 6.1.2

Dependence of Permeability Coefficient on Pumping Time (Grade 9)

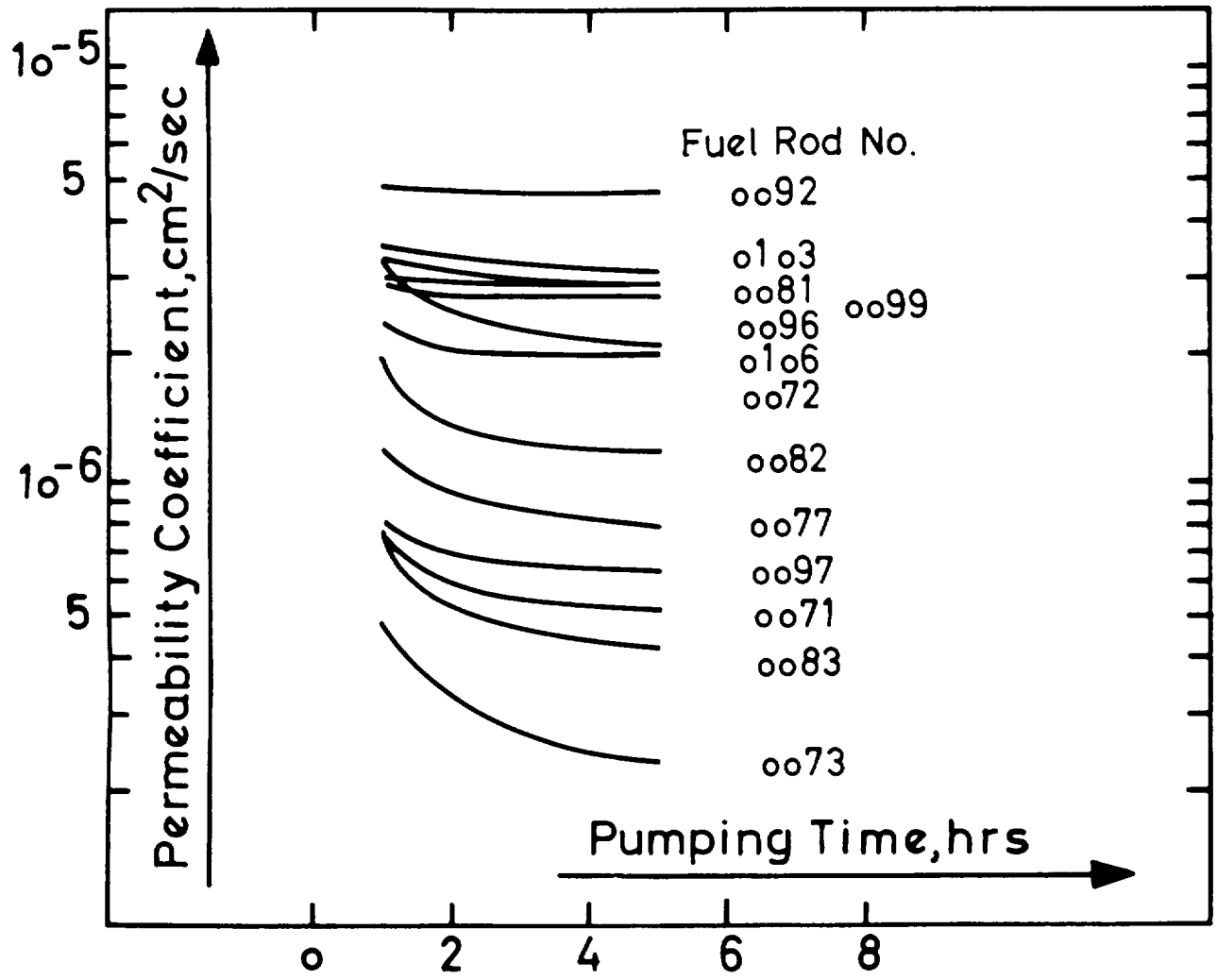


Fig. 6.1.3

Dependence of Permeability Coefficient on Pumping Time (Grade9)

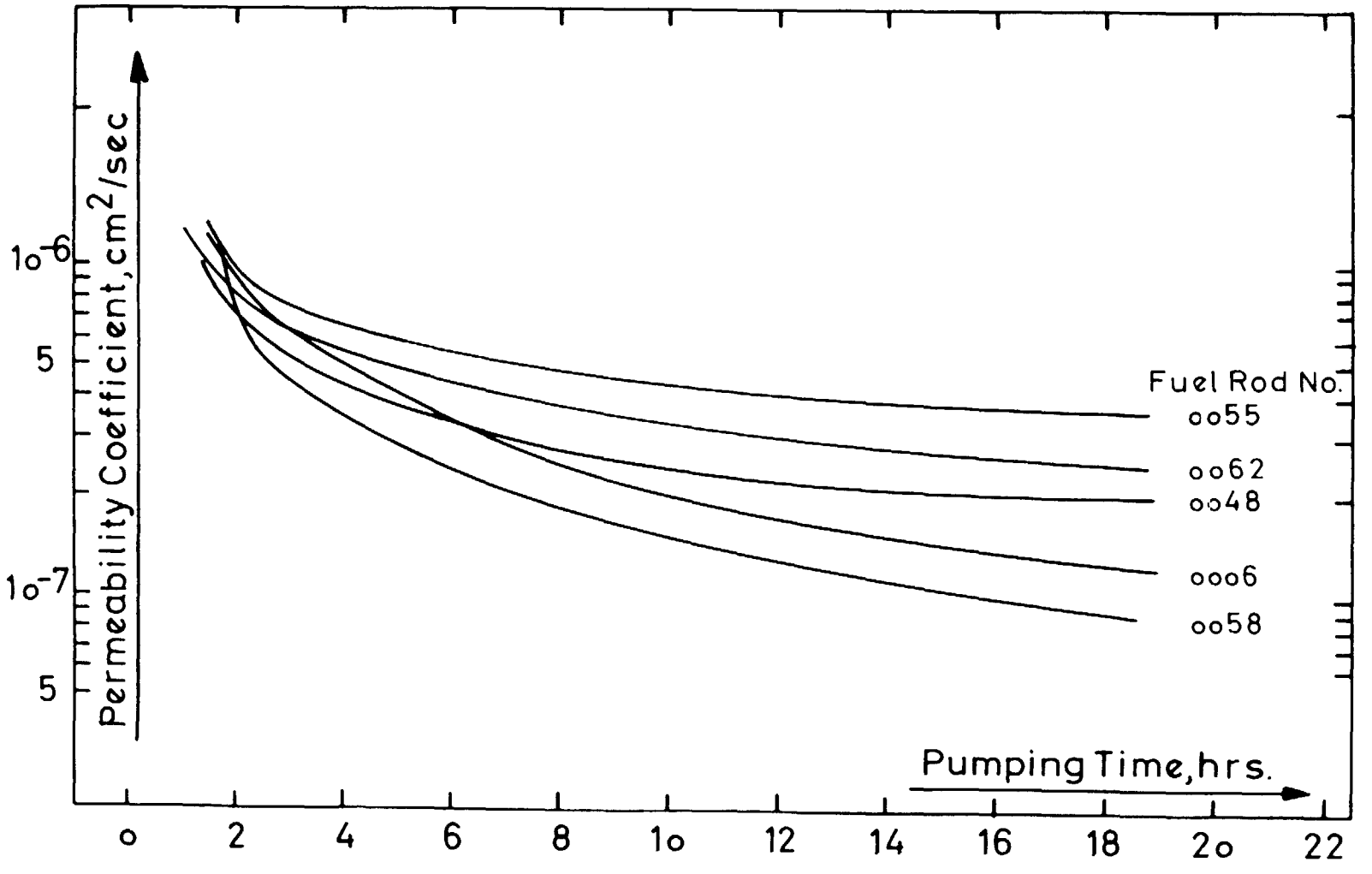


Fig. 6.1.4

Dependence of Permeability Coefficient on Pumping Time (Grade 6)

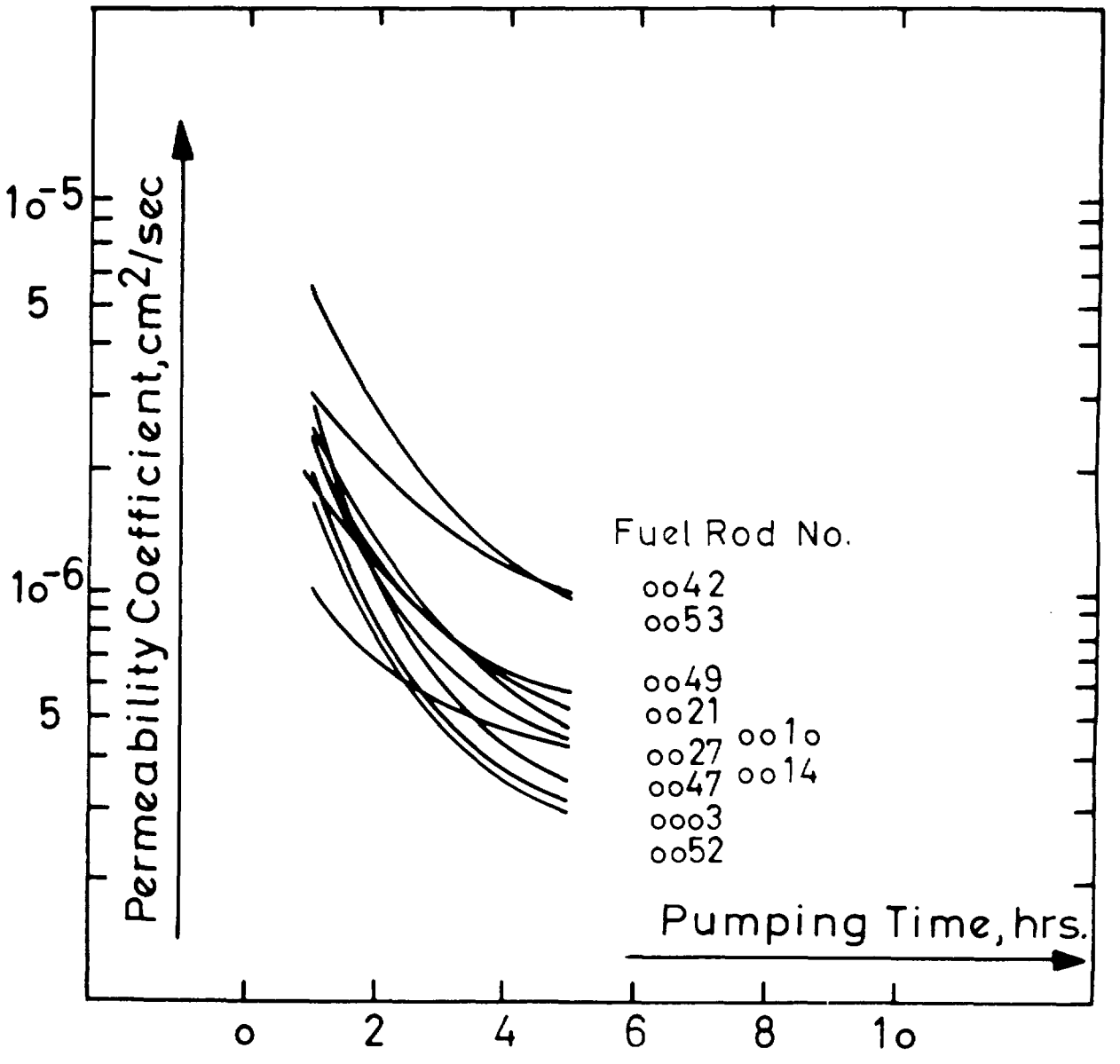


Fig. 6.1.5

Dependence of Permeability Coefficient on Pumping Time (Grade 6)

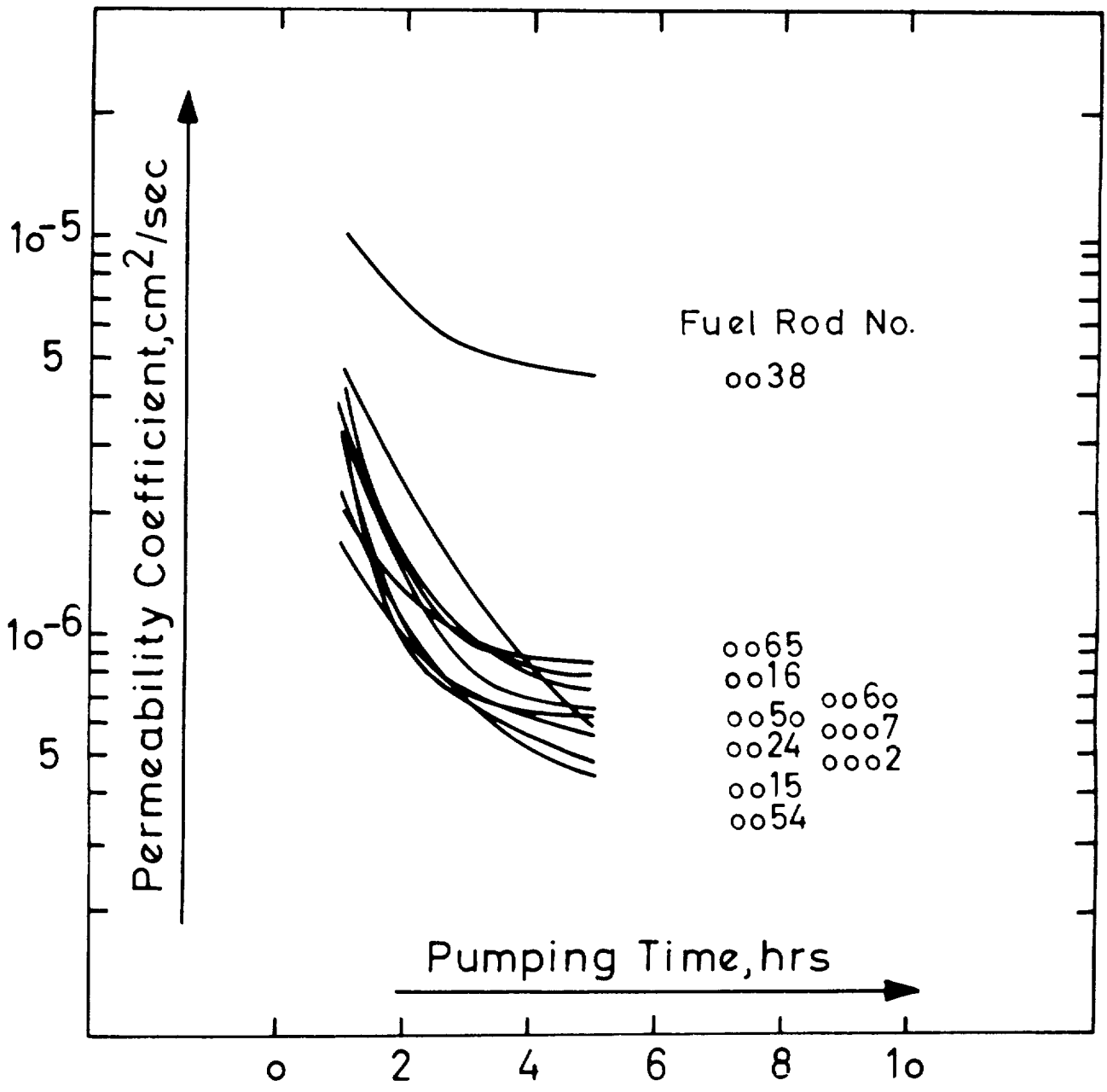


Fig. 6.1.6

Dependence of Permeability Coefficient on Pumping Time (Grade 6)

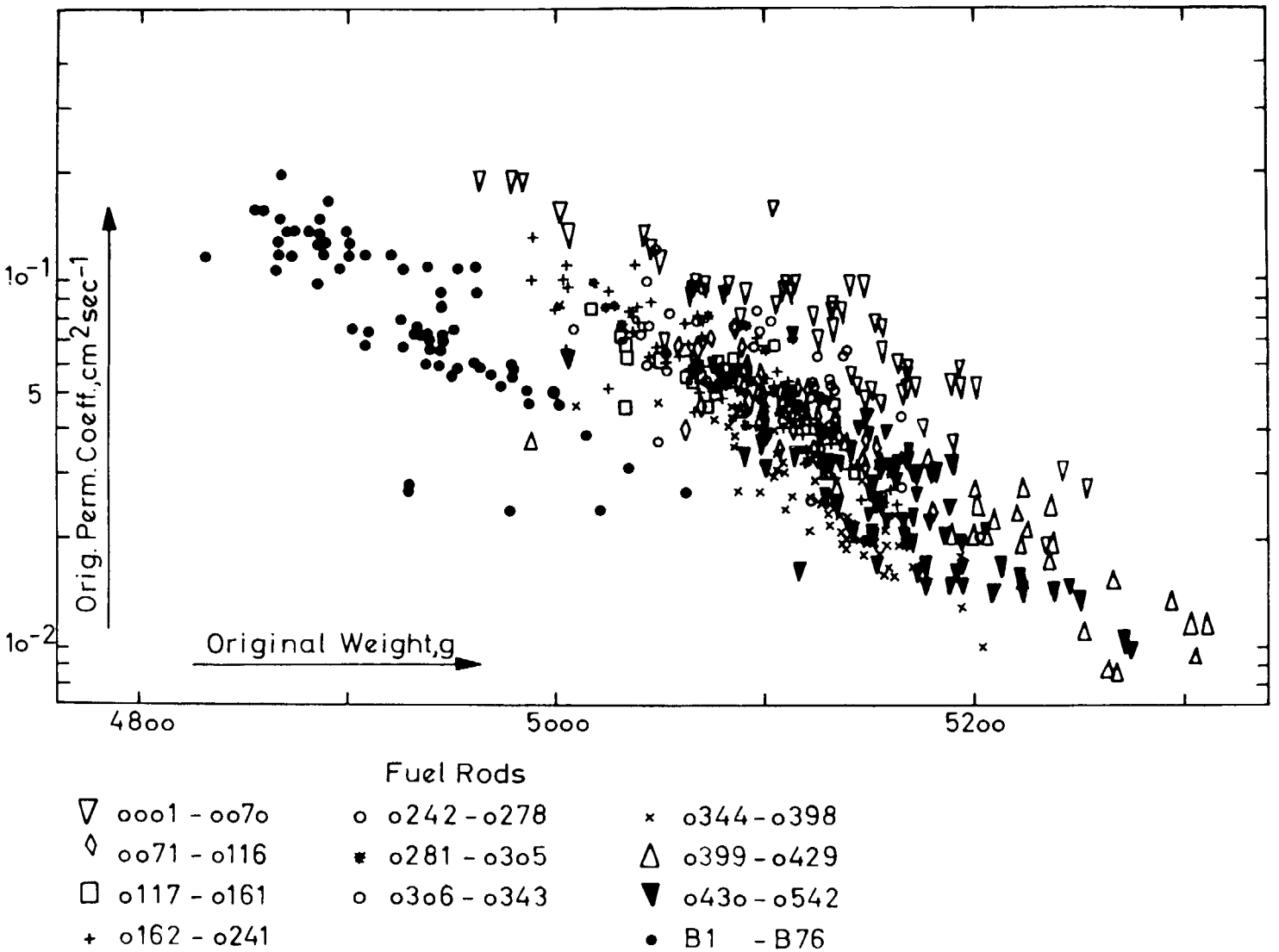


Fig. 6.2.1

Relation Between Original Permeability and Original Weight

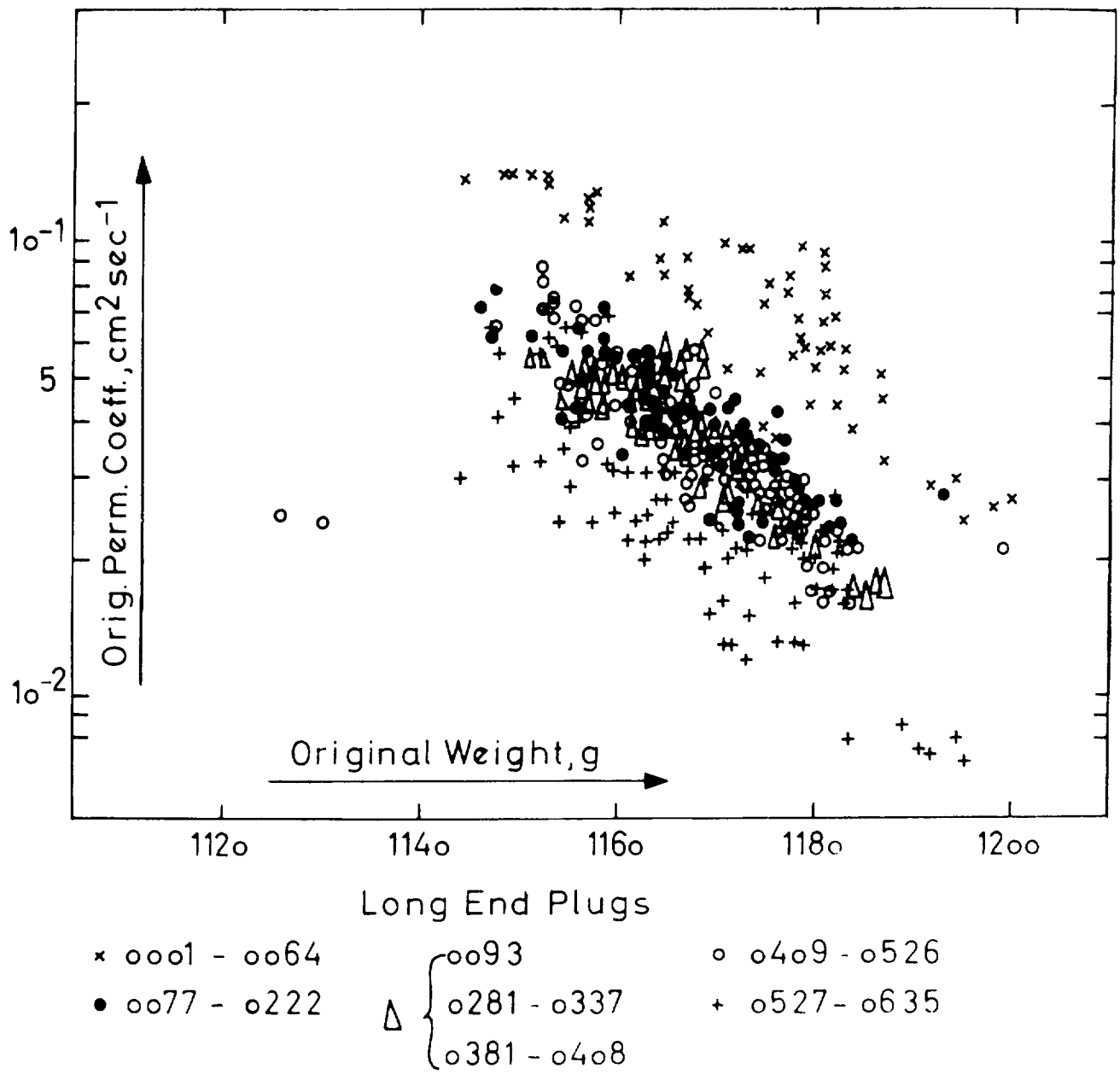
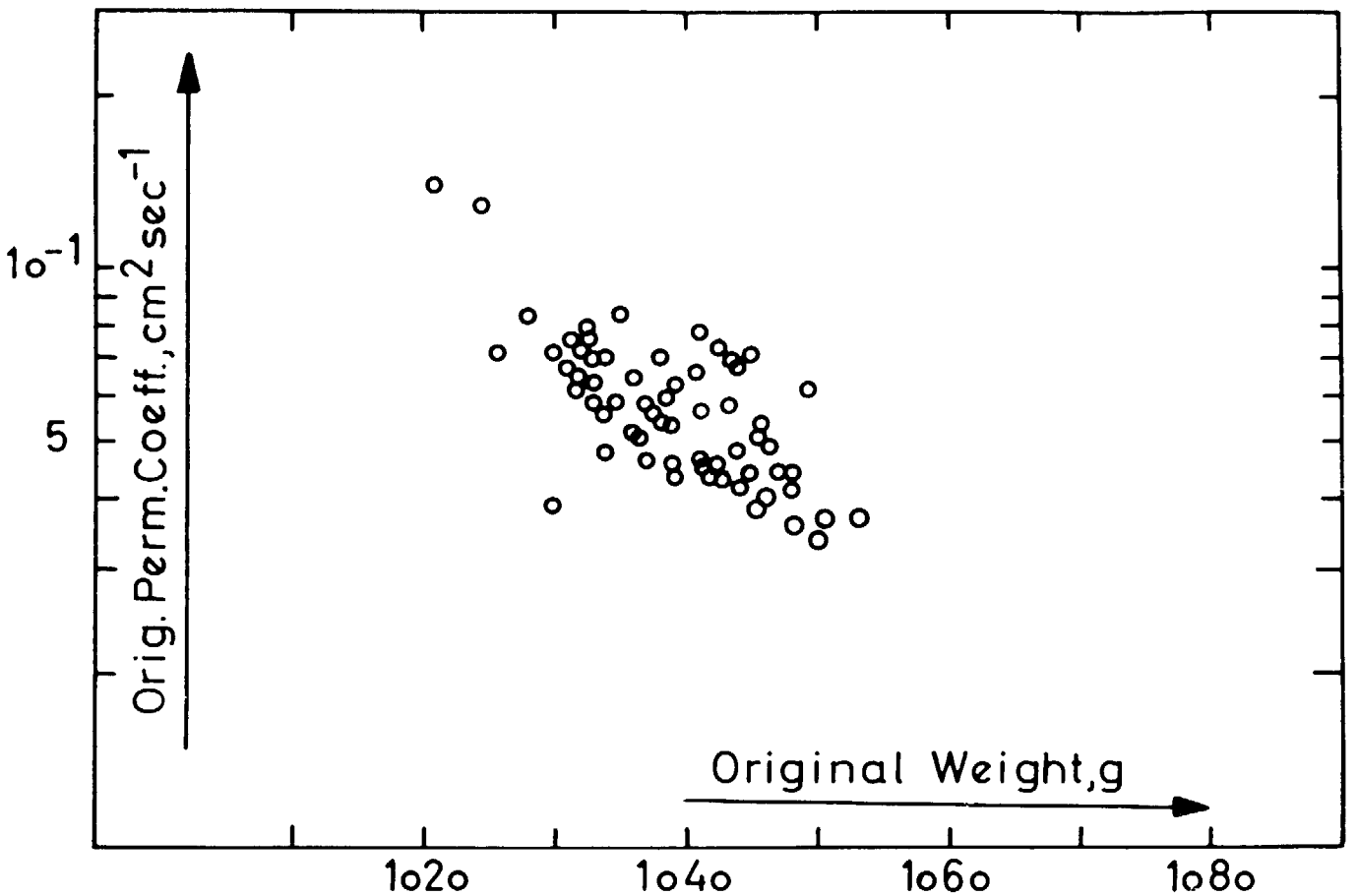


Fig. 6.2.2

Relation Between Original Permeability and Original Weight



Long End Plugs

o BP 1 - BP 66

Fig. 6.2.3

Relation Between Original Permeability and Original Weight

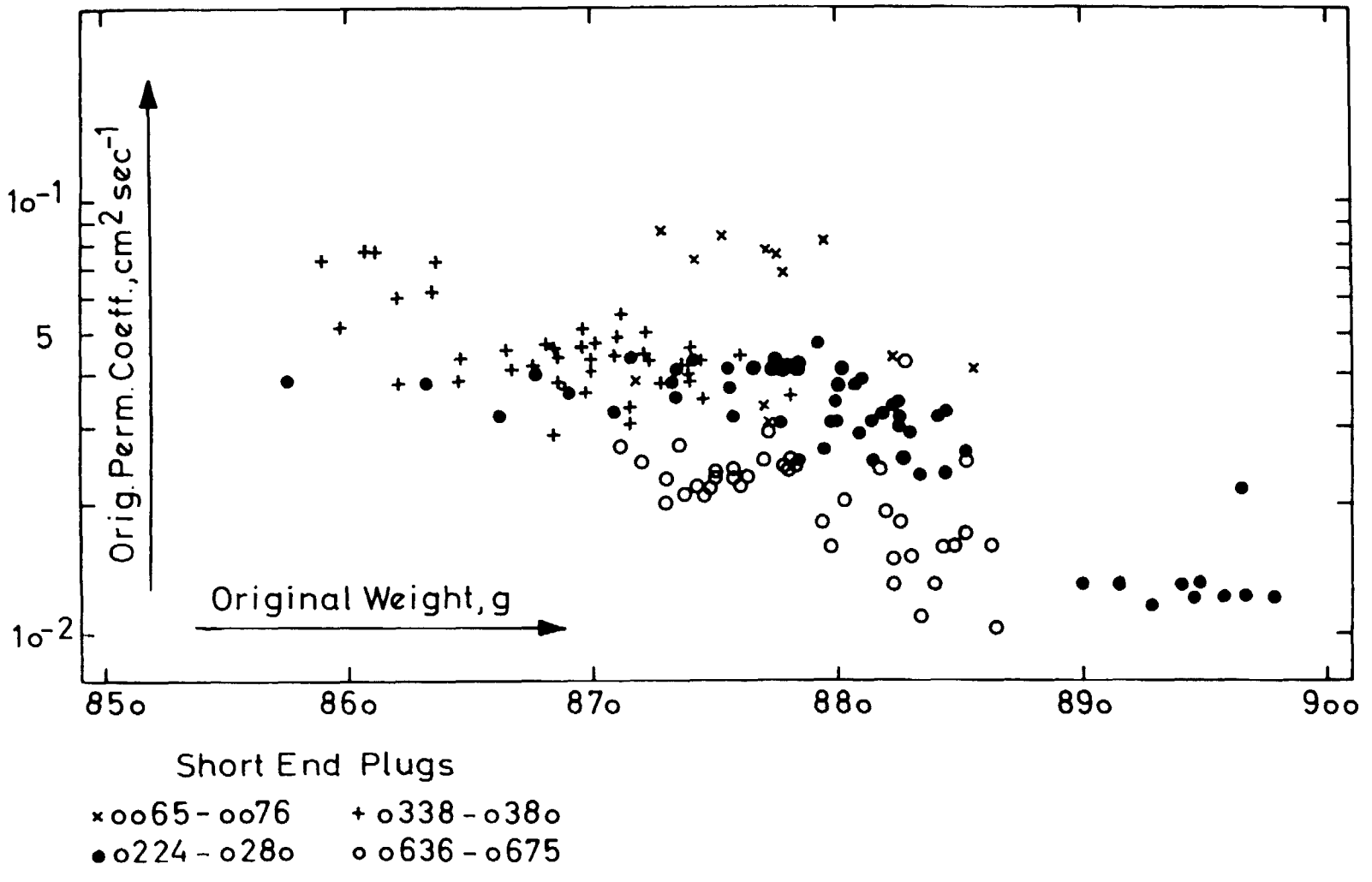
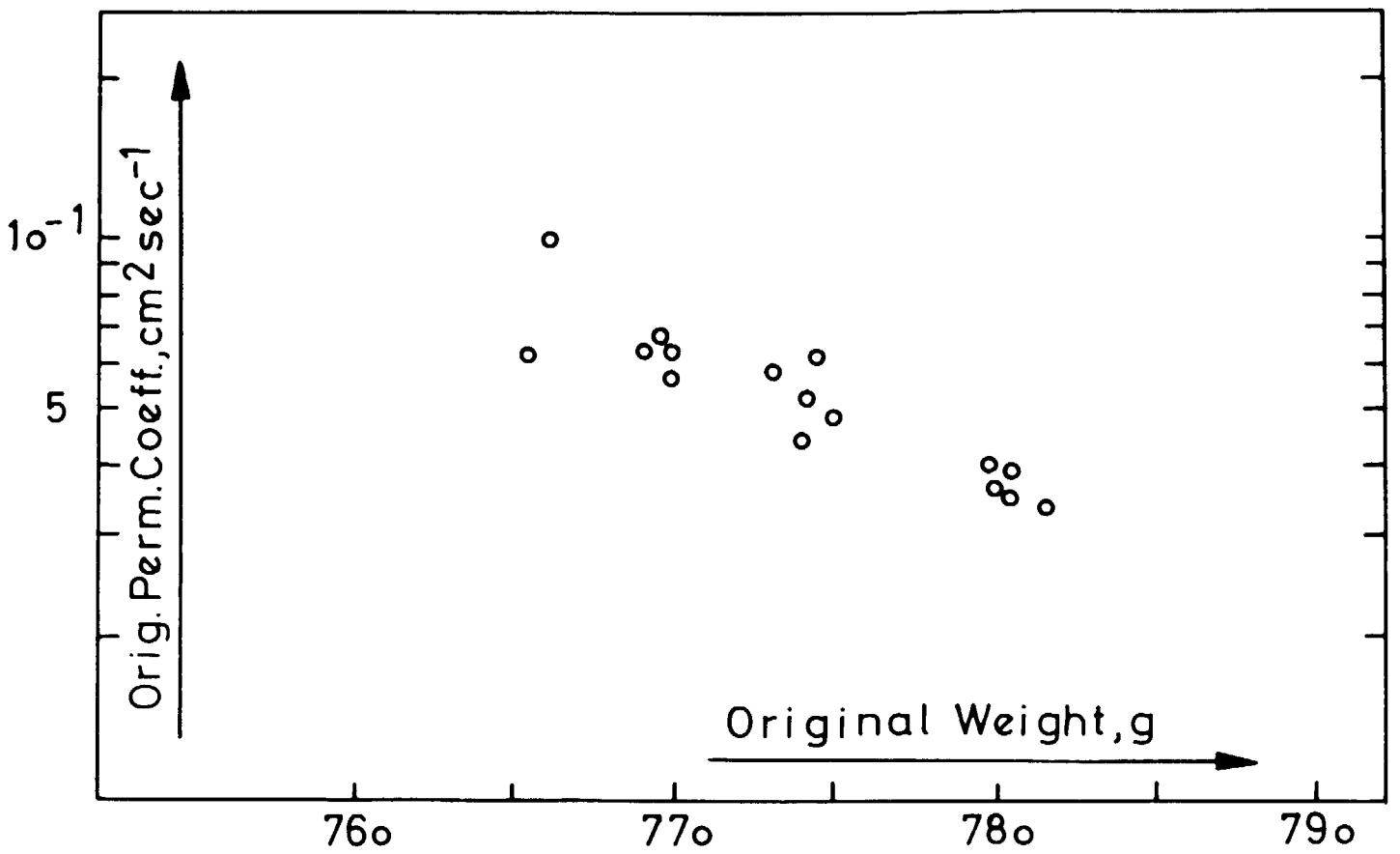


Fig. 6.2.4

Relation Between Original Permeability and Original Weight



Short End Plugs

o BPs 1 - BPs 16

Fig. 6.2.5

Relation Between Original Permeability and Original Weight

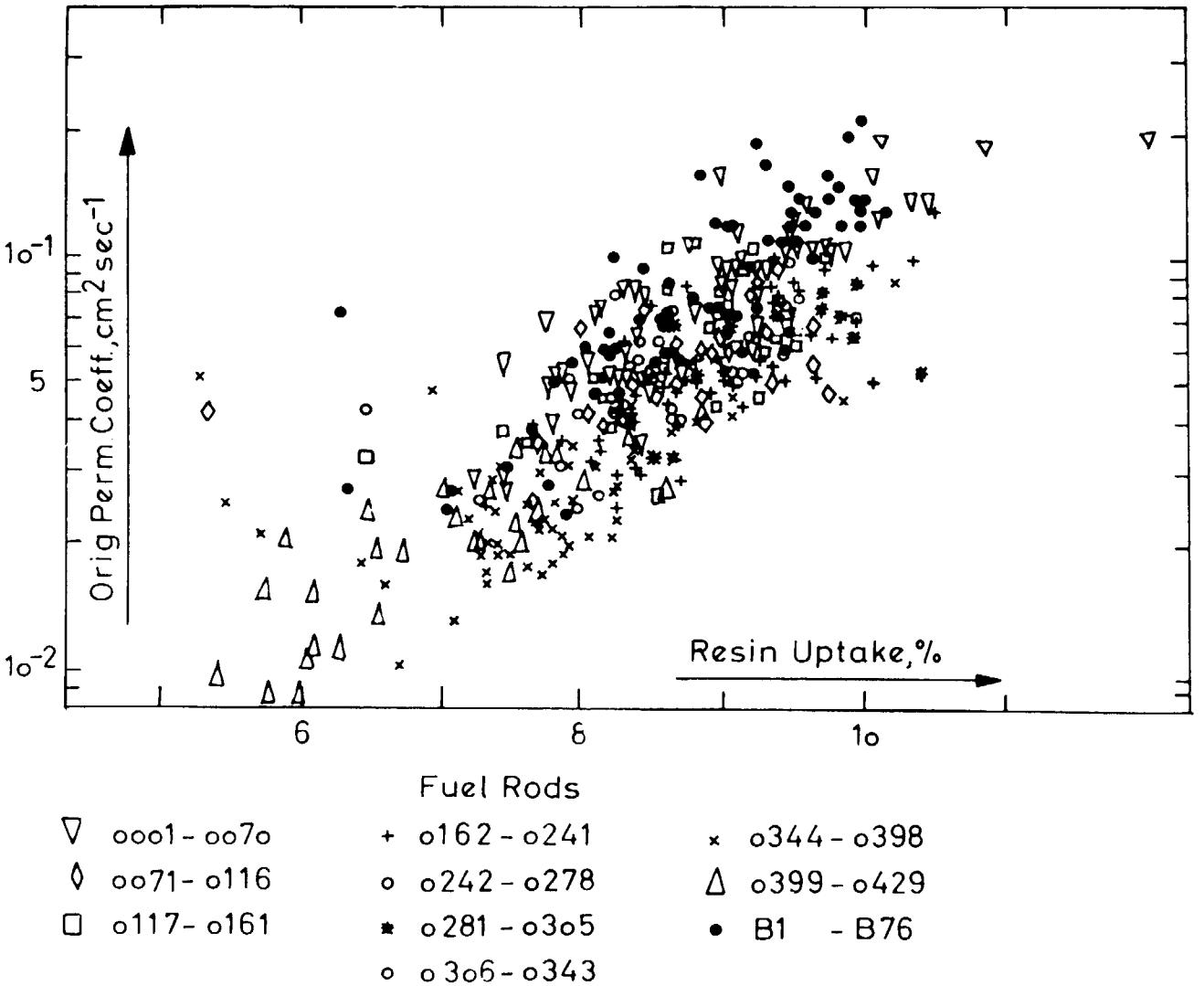


Fig. 6.3.1

Relation Between Resin Uptake (1st Impr.) and Original Permeability

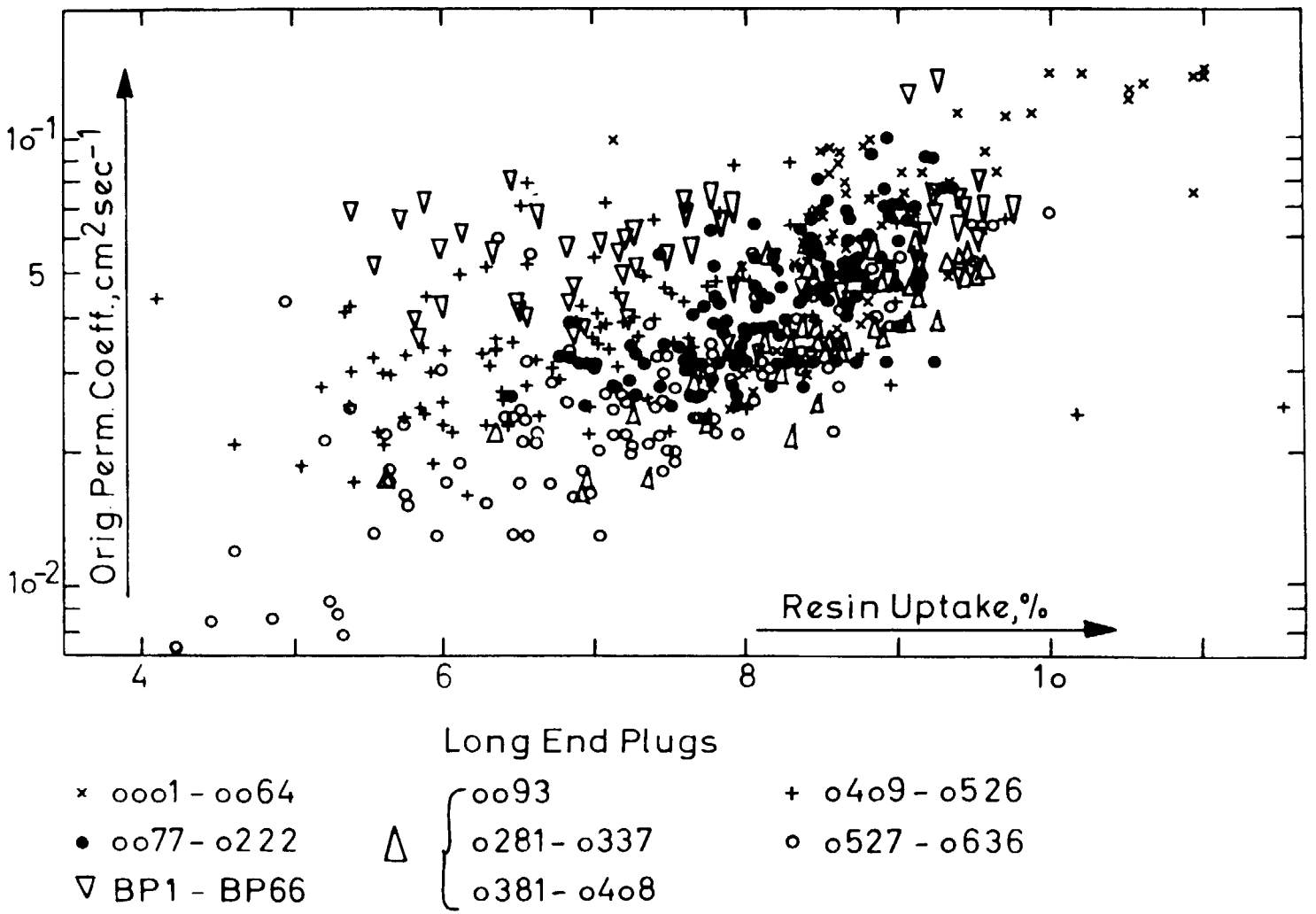


Fig. 6.3.2

Relation Between Resin Uptake (1st Impr.) and Original Permeability

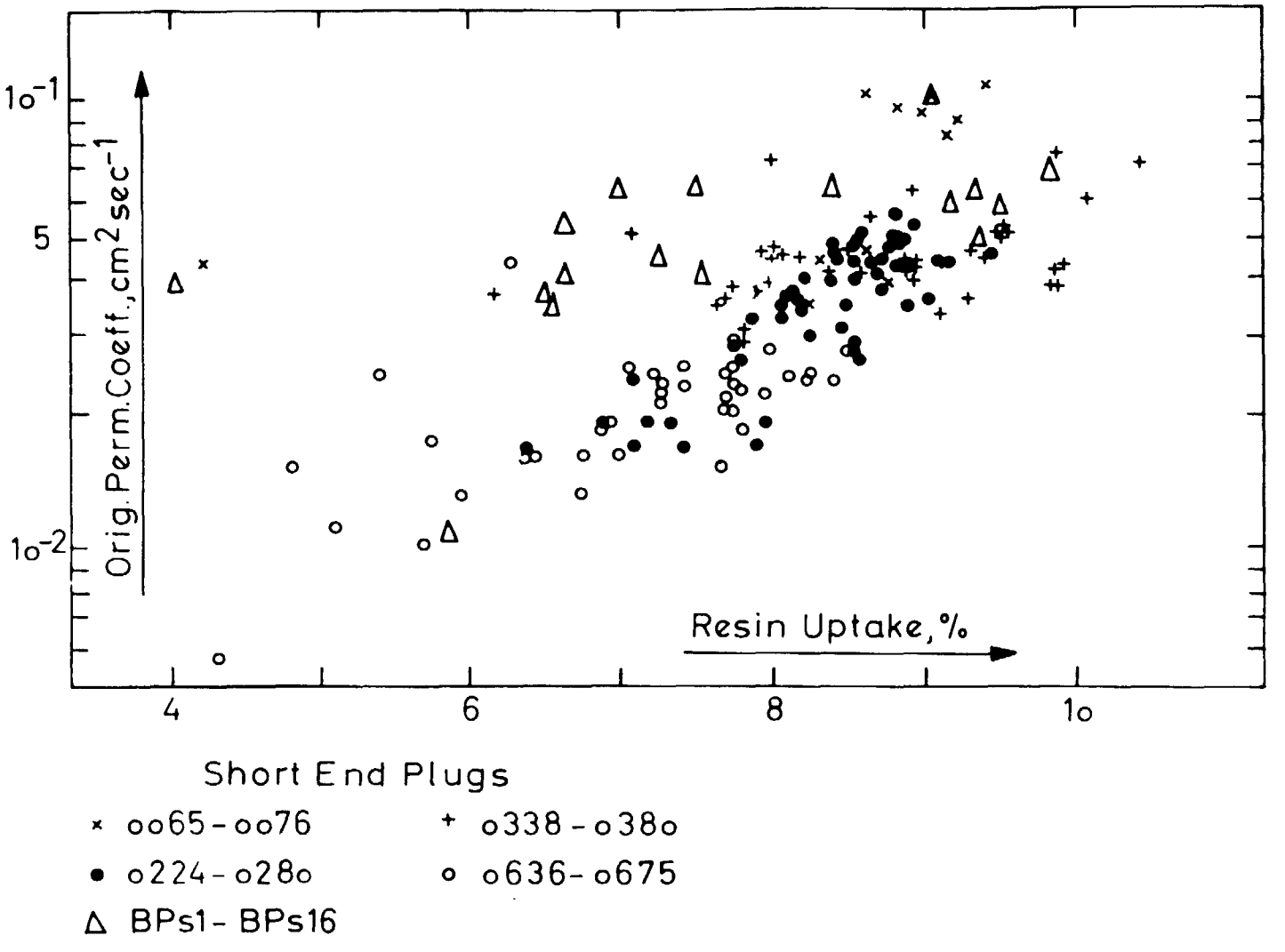


Fig. 6.3.3

Relation Between Resin Uptake (1st Impr.) and Original Permeability

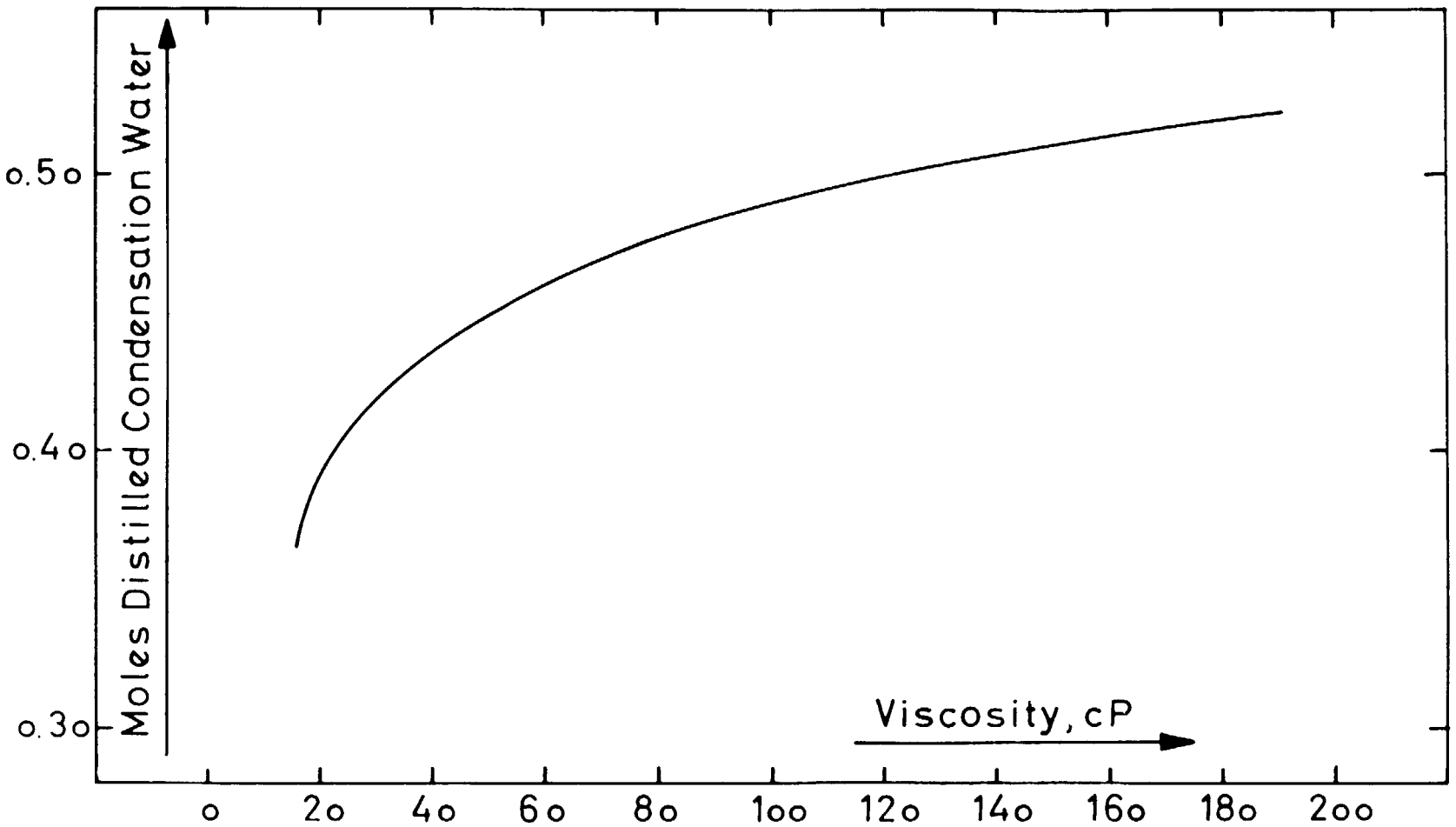


Fig. 8.2.1

Relation Between Viscosity and Distilled Condensation Water

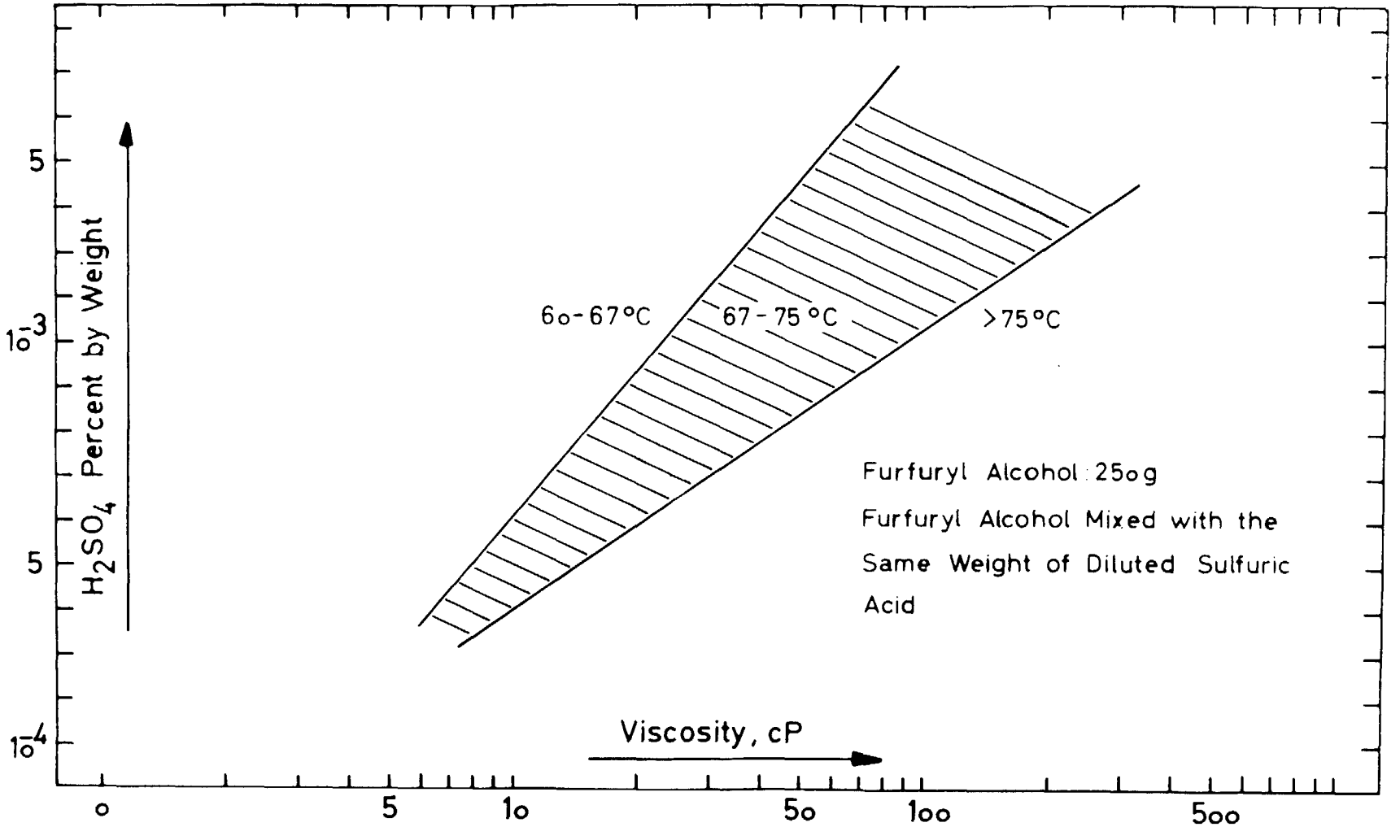


Fig. 8.3.1.

Relation Between Quantity of Catalyst and Precondensation Temperature

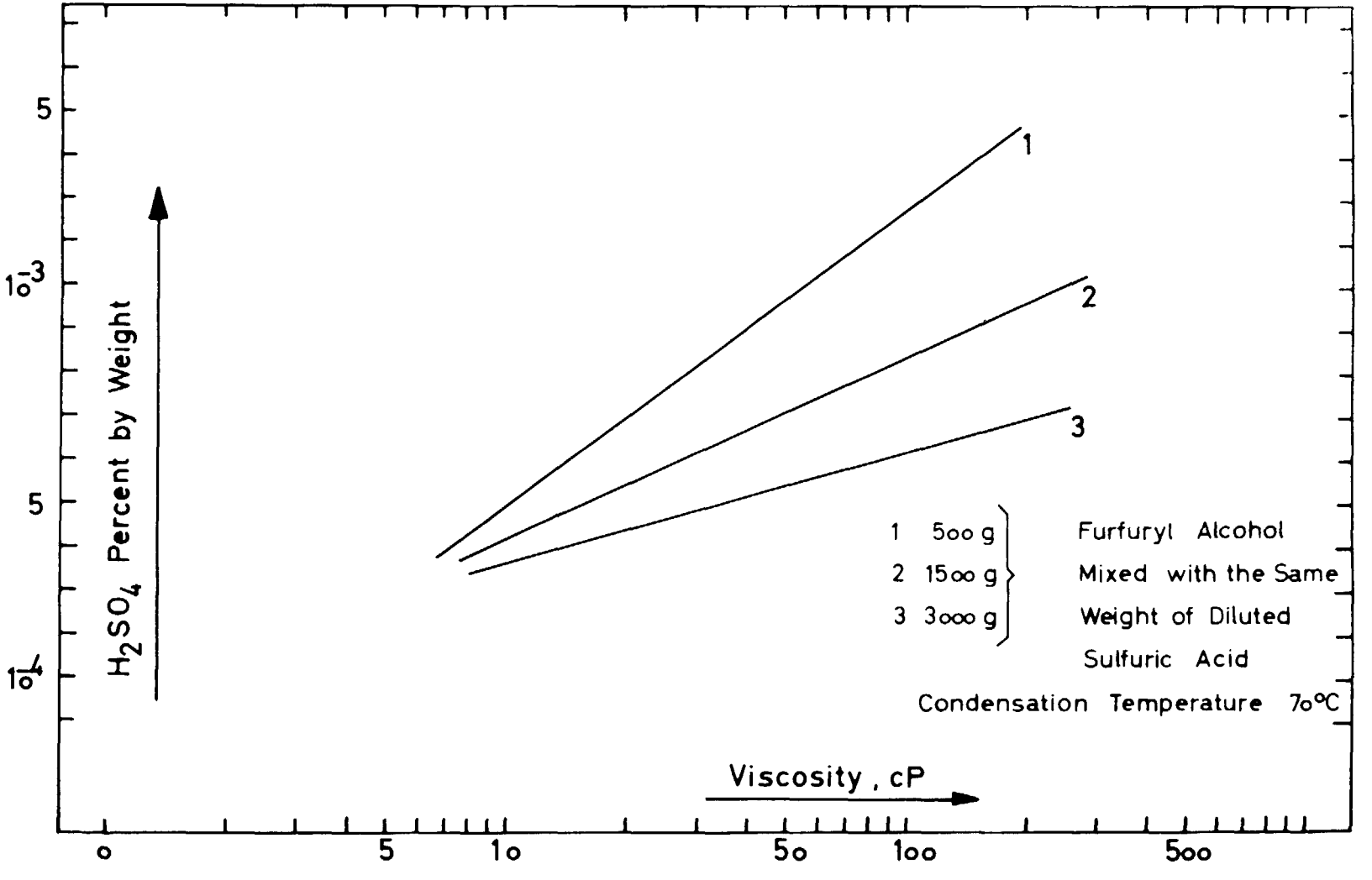


Fig. 8.3.2.

Dependence of Viscosity on Percentage of Catalyst and Quantity of Furfuryl Alcohol