SHIPPING • UNPACKING

INSTRUCTIONS

SHIPMENT OF TRANSFORMERS IN DRY NITROGEN

SHIPMENT

Transformers are shipped in dry nitrogen when the oil filled weights are too great for shipment or if specified by the customer.

Detachable radiators are usually removed and crated for shipment. The radiator valves on the transformer case are fitted with blind flanges and the radiator header openings are sealed with metal covers to keep out dirt and moisture.

Bushings are shipped on the transformers when shipping clearances permit and there is no chance of their being damaged. The crates used for bushings removed for shipment are securely fastened down and are constructed to prevent handling and shipping damage. The bushing adapter flanges on the transformer case are sealed with blind flanges.

Lightning arresters, when ordered, are shipped in crates designed to prevent handling and shipping damage. The mounting brackets may be removed from the transformer for shipment.

If shipping clearances permit, most fittings that are rugged enough to stand shipping strains are shipped mounted in place. Those that are removed are crated for shipment.

Outline drawing notes indicate the parts that are to be shipped dismounted. Generally, these fittings are shipped on the same car or vehicle to allow immediate assembly.

Transformers are shipped in their own tanks in an upright position when shipping clearances and weights permit. Special sectionalizing of the tank, shipment in a horizontal position or special shipping tanks or covers are avoided if possible. Such forms of shipment will have been cleared with the purchaser in advance and are shown on the outline drawing. Any special bracing required, which must be removed by the erectors before installation, will also be described on the outline drawings.

UNPACKING

CAUTION: The coils and insulation should be covered with oil as soon as possible to avoid absorption of moisture from the atmosphere.

Checking Transformers At Time of Arrival. Transformers shipped in nitrogen are factory sealed and filled with nitrogen to a pressure slightly in excess of three psi at approximately 25°C. The condition of the transformers at the time of arrival should be determined by the following sequence.

Pressure. A pressure reading should be made as soon after arrival as possible and after the temperature has been fairly constant for several hours. A low pressure gauge (preferably one with a vacuum scale) should be attached to an upper filter press valve using caution against loss of gas and intake of air. Absolute pressure (gauge reading + 14.7) varies directly with absolute temperature (temperature reading degrees C plus 273).

Oxygen Content. After the pressure test has been made the oxygen content should be measured using a standard Orsat flue gas analyser or a Fyrite Oxygen Indicator, Westinghouse S#1408196. If the transformer pressure is low, much care should be taken to prevent outside air from affecting the reading. Compare the increase of oxygen content with values at time of shipment. A slight increase can be expected due to diffusion of trapped air after the factory measurement was made.

Dehydrating Material. After the pressure and oxygen content tests are complete, remove the dehydrating container and moisture indicator from the transformer as indicated on the outline drawing. Replace the manhole or handhole cover on the transformer and weigh the dehydrating material container that was removed. Report this weight.

The moisture indicator should be checked immediately before it is affected by outside moisture.

Interpretation of Results. No limits of pressure, oxygen content or moisture content can be given for determining whether or not the transformer may be put into service without drying out. It is therefore essential that full advantage be taken of the indications afforded by the measurements outlined above, supplemented when necessary by insulation resistance measurements.

SHIPMENT OF TRANSFORMERS

The following combination of results may be taken as indicating that the transformer is in a dry condition:

1. All readings close to those reported on instruction card.

2. Low pressure with low oxygen and low moisture content.

3. High pressure, low moisture and high oxygen (not exceeding 5%).

If the combination of readings is not reassuring, insulation resistance measurements, with the transformer heated to 60—70 degrees C, should be made to aid in making a decision as to the advisability of drying out the transformer before placing in service.

The transformer will undoubtedly require drying out in the following cases:

1. Obvious damage during transit to the shipping container, resulting in complete loss of pressure and complete diffusion of air into the container.

2. Low pressure, high oxygen, high moisture content.

Damage in Transit. Loss of pressure resulting from damage in transit should be reported immediately.

Reports. If the dryness of the transformers as received is questionable, it is requested that reports of readings on each transformer be forwarded to the nearest Westinghouse Sales Office.

Filling Transformer with Oil for Storage or Service. Transformers should be filled with WEMCO C oil with standard insulation strength for either storage or service as soon as possible after arrival at their destinations. To get the maximum strength of the insulation immediately after filling it is necessary to fill under vacuum. If not filled under vacuum, it may require several weeks to reach maximum insulation strength.

Temporary Storage of Transformers in Nitrogen: Storage in nitrogen is not recommended unless it is an absolute necessity. Transformers should not be stored in nitrogen for periods exceeding one month without nitrogen cylinders with reducing valves connected to the case. Storage with nitrogen cylinders attached should be limited to a period of three months and should never exceed six months.

For both cases of nitrogen storage only the pressure and oxygen measurements should be made on receipt to avoid admission of air. If the pressure is low but the oxygen content indicates negligible admission of air, the pressure should be restored to approximately three pounds per square inch by introducing dry nitrogen under pressure. In case of high oxygen content, the tank should be blown out with dry nitrogen until an oxygen content of 1% or less is obtained, after which the pressure should be built up to three pounds.

The cause of low pressure should be determined and eliminated.

Before filling with oil after the transformers have been stored in nitrogen, the transformers should be checked following the procedure under "Checking Transformers at Time of Arrival".

Nitrogen. Commercial nitrogen is not satisfactory for use in transformers on account of its relatively high humidity. Westinghouse nitrogen PDS # 6306 is used for shipping purposes and for Inertaire transformers. It is specially processed to insure a uniformly low moisture content. This nitrogen is put up in cylinders which may be obtained from several different suppliers. Contact nearest Westinghouse Sales office for nearest supplier of approved nitrogen.

Storage of Fittings. All bushings and accessories that are shipped separately should be thoroughly protected against moisture until they are installed.

WESTINGHOUSE ELECTRIC CORPORATION
SHARON PLANT • TRANSFORMER DIVISION • SHARON, PA.
Printed in U.S.A.

INSTRUCTIONS

PARALLEL OPERATION

The theoretically ideal conditions for paralleling transformers are:

1. Identical turns ratios and voltage ratings.
2. Equal percent impedances.
3. Equal ratios of resistance to reactance.
4. Same polarity.
5. Same phase angle shift.
6. Same phase rotation.

Single Phase Transformers. For single phase transformers only the first four conditions apply as there is no phase rotation or phase angle shift due to voltage transformation.

If the turns ratios are not the same a circulating current will flow even at no load. If the percent impedance or the ratios of resistance to reactance are different there will be no circulating current at no load, but the division of load between the transformers when applied will no longer be proportional to their KVA ratings.

Three Phase Transformers. The same conditions hold true for three phase transformers except that in this case the question of phase rotation and phase angle shift must be considered.

Phase Angle Shift. Certain transformer connections as the wye-delta or wye-zigzag produce a 30° shift between the line voltages on the primary side and those on the secondary side. Transformers with these connections therefore cannot be paralleled with other transformers not having this shift such as wye-wye, delta-delta, zigzag-delta, or zigzag-zigzag.

Phase Rotation. Phase rotation refers to the order in which the terminal voltages reach their maximum values. In paralleling, those terminals whose voltage maximums occur simultaneously are paired.

Power Transformer Practice. The preceding discussion covered the theoretically ideal requirements for paralleling. In actual practice good paralleling is obtained even though the actual transformer conditions deviate by small percentages from the theoretical ones.

Good paralleling is considered as attainable when the percentage impedances of two winding transformers are within 7.5% of each other. For multi-winding and auto-transformers the generally accepted limit is 10%.

Furthermore, in power transformers of normal design the ratio of resistance to reactance is generally sufficiently small to make the requirement of equal ratios of negligible importance in paralleling.

When it is desired to parallel transformers having widely different impedances, reactors or auto-transformers having the proper ratio should be used. If a reactor is used it is placed in series with the transformer whose impedance is lower. It should have a value sufficient to bring the total effective percent impedance of the transformer plus the reactor up to the value of the percent impedance of the second transformer. When an auto-transformer is used, the relative currents supplied by each transformer are determined by the ratio of the two sections of the auto transformer. The auto-transformer adds a voltage to the voltage drop in the transformer with the lower impedances and substracts a voltage from the voltage drop in the transformer with the higher impedance. Auto-transformers for use in paralleling power transformers are designed especially for each installation. The method of connecting the auto-transformer is shown in a wiring diagram furnished with each installation.

In general, transformers built to the same manufacturing specifications as indicated by the nameplate may be operated in parallel.

In connecting transformers in parallel when the low tension voltage is comparatively low, care should be taken to see that corresponding connecting bars or conductors have approximately the same impedance, otherwise the currents will not divide properly.

WESTINGHOUSE ELECTRIC CORPORATION
SHARON PLANT • TRANSFORMER DIVISION • SHARON, PA.

SUPERSEDES I.L. 47-600-4
Printed in U.S.A.

AUGUST, 1955

EQUIPMENT • PROCEDURE

INSTRUCTIONS

REMOVING AND REPLACING WELDED-ON COVERS AND TANKS

REMOVING THE WELD

There are times when it becomes necessary to remove a welded-on cover from a transformer tank or the top section from the bottom section of a form-fit tank. This may be done by either chipping out the joining weld or cutting out the weld with a gas cutting torch. The equipment required and a suggested procedure to remove the weld is described below.

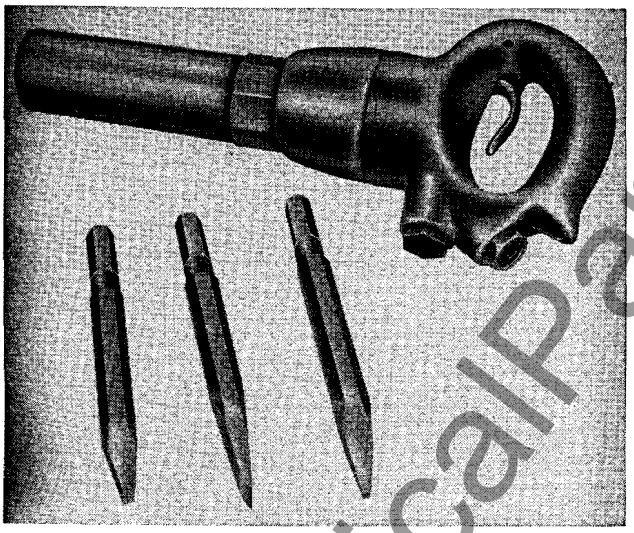

FIG. 1. Recommended Equipment

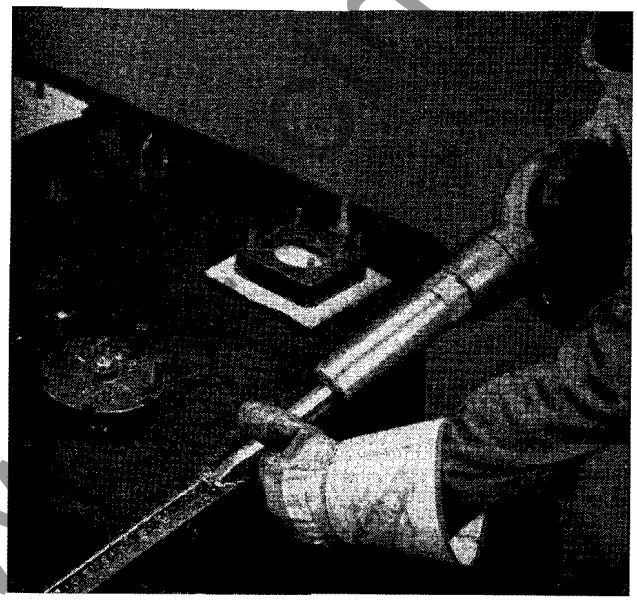

FIG. 2. Removal Procedure

CHIPPING OUT A WELD

Equipment. The equipment recommended to remove a weld by chipping is:

1. A heavy pneumatic chipping hammer.

2. Three-eighths and 1/8 inch diamond-pointed chisels. The chisels should be forged tools, hardened and tempered so that the edges will not turn or spall. The cutting edges of the diamond-pointed chisels should be ground straight with no chamfer.

3. Flat chisels. The flat chisel should have the flat side relieved 1/64", approximately 1/8" back from the cutting edge. This prevents the chisel from "digging-in" and allows the operator better control of its cutting.

4. Gloves and safety glasses should be worn by the operator for his personal protection.

Procedure. It is important to cover any openings into the tank, to avoid entry of chips. To remove a weld by chipping, apply machine oil or grease to the surface of the weld to lubricate the cutting. A 3/8 inch diamond-point chisel is used in the pneumatic hammer and the chisel is held so that the diamond is pointed into the root of the joint. The chisel should cut 1/8" back of the vertical edge of the weld and along the face of the horizontal

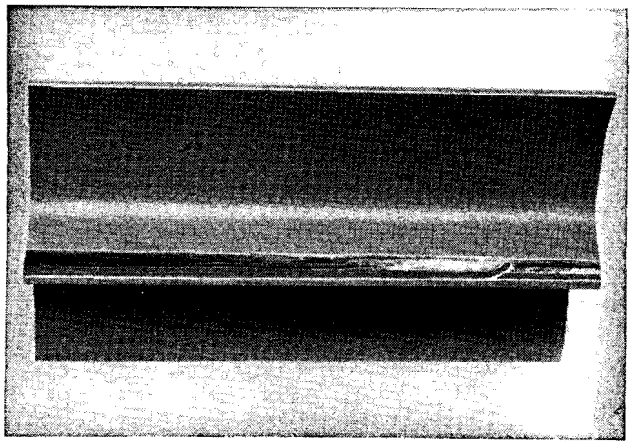

FIG. 3. Weld Partially Removed

INSTRUCTIONS

CLEANING TRANSFORMER INSULATION

There are times when it may become necessary to clean transformer insulation because of the accumulation of dust, grease, sludge or carbon deposits. The method for cleaning varies with the type of transformers.

DRY-TYPE TRANSFORMERS

Dust, free of oil or grease, may be removed by wiping with a clean dry rag or by using a vacuum cleaner equipped with a brush attachment. The vacuum cleaner is preferred for large areas. Dust may be blown from inaccessible parts, but any dust removed by blowing is scattered and much of it will settle on other parts from which it must be removed as outlined above. The air must contain no moisture and care must be observed so that the insulation materials are not damaged by excessive air velocity.

Should grease or oil get upon the insulation it may be removed by wiping dry with a clean dry cloth.

Loose carbon deposits may be removed by brushing and/or wiping with clean dry cloths. Defective insulation should be replaced.

OIL-FILLED TRANSFORMERS

Loose coatings of sludge and dirt may be removed by wiping with cloths saturated with transformer oil. Tightly adhering or heavy coatings of sludge may require a light brushing with a bristle brush, followed by a wash with transformer oil.

Sludge, dirt and oil-carbon deposits may often be effectively removed by spraying clean, dry, transformer oil upon and around the insulation with sufficient velocity to thoroughly wash and clean it. An air-ejector type nozzle should be used. Defective insulation should be replaced.

Important: Do not use knives, screw drivers or other sharp objects to clean coils since the use of these objects may cut the insulation.

INERTEEN-FILLED TRANSFORMERS

Normally, the cleaning of insulation is not necessary for Inerteen transformers because Inerteen does not sludge. However, should it be necessary to remove a deposit of dirt, it may be done by wiping with a cloth saturated with clean Inerteen or trichlorbenzene.

When arcing occurs in Inerteen, the insulation is attacked by the products of decomposition of the Inerteen and usually requires replacing. The products of decomposition of Inerteen 7336-8 now used in transformers have less effect on insulation than those from the earlier types of Inerteens. Hence it is more likely that the insulation in these transformers, not affected by direct arcing, may be used again.

For precautions in handling Inerteen refer to instruction book on Inerteen Transformers.

Important: Carbon tetrachloride should never be used for cleaning the insulation of either liquid filled or dry type transformers because it is nearly impossible to remove all of the carbon tetrachloride used for cleaning purposes, and during the natural operation of the transformers, the remaining carbon tetrachloride will form hydrochloric acid which will cause corrosion of metal parts and detrimentally affect the insulation.

This general procedure is not to be followed when specific instructions accompany the apparatus.

WESTINGHOUSE ELECTRIC CORPORATION
SHARON PLANT • TRANSFORMER DIVISION • EMERYVILLE PLANT
SHARON, PA. EMERYVILLE, CALIF.

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Printed in U.S.A.

JULY, 1951
(Rep. 12-57)

INSTRUCTIONS

PARALLEL OPERATION

The theoretically ideal conditions for paralleling transformers are:

1. Identical turns ratios and voltage ratings.
2. Equal percent impedances.
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Phase Angle Shift. Certain transformer connections as the wye-delta or wye-zigzag produce a 30° shift between the line voltages on the primary side and those on the secondary side. Transformers with these connections therefore cannot be paralleled with other transformers not having this shift such as wye-wye, delta-delta, zigzag-delta, or zigzag-zigzag

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Furthermore, in power transformers of normal design the ratio of resistance to reactance is generally sufficiently small to make the requirement of equal ratios of negligible importance in paralleling.

When it is desired to parallel transformers having widely different impedances, reactors or auto-transformers having the proper ratio should be used. If a reactor is used it is placed in series with the transformer whose impedance is lower. It should have a value sufficient to bring the total effective percent impedance of the transformer plus the reactor up to the value of the percent impedance of the second transformer. When an auto-transformer is used, the relative currents supplied by each transformer are determined by the ratio of the two sections of the auto transformer. The auto-transformer adds a voltage to the voltage drop in the transformer with the lower impedances and substracts a voltage from the voltage drop in the transformer with the higher impedance. Auto-transformers for use in paralleling power transformers are designed especially for each installation. The method of connecting the auto-transformer is shown in a wiring diagram furnished with each installation.

In general, transformers built to the same manufacturing specifications as indicated by the nameplate may be operated in parallel.

In connecting transformers in parallel when the low tension voltage is comparatively low, care should be taken to see that corresponding connecting bars or conductors have approximately the same impedance, otherwise the currents will not divide properly.

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SHARON PLANT • TRANSFORMER DIVISION • SHARON, PA.

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AUGUST, 1955

EQUIPMENT • PROCEDURE

INSTRUCTIONS

REMOVING AND REPLACING WELDED-ON COVERS AND TANKS

REMOVING THE WELD

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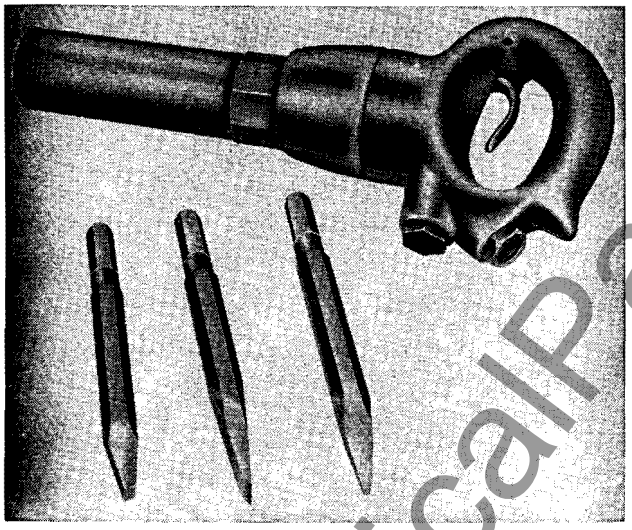
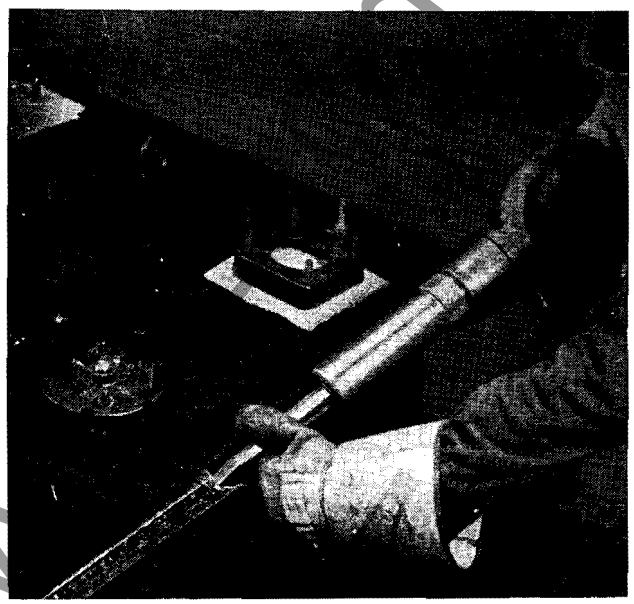


FIG. 1. Recommended Equipment



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Equipment. The equipment recommended to remove a weld by chipping is:

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3. Flat chisels. The flat chisel should have the flat side relieved 1/64", approximately 1/8" back from the cutting edge. This prevents the chisel from "digging-in" and allows the operator better control of its cutting.

4. Gloves and safety glasses should be worn by the operator for his personal protection.

Procedure. It is important to cover any openings into the tank, to avoid entry of chips. To remove a weld by chipping, apply machine oil or grease to the surface of the weld to lubricate the cutting. A 3/8 inch diamond-point chisel is used in the pneumatic hammer and the chisel is held so that the diamond is pointed into the root of the joint. The chisel should cut 1/8" back of the vertical edge of the weld and along the face of the horizontal

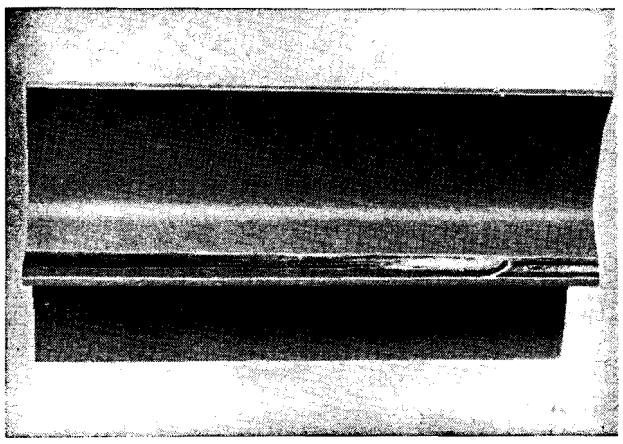

FIG. 3. Weld Partially Removed

SUPERSEDES I.L. 47-600-21E

INSTRUCTIONS

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SHARON PLANT • TRANSFORMER DIVISION • SHARON, PA.

SUPERSEDES I.L. 47-600-4
Printed in U.S.A.

AUGUST, 1955

EQUIPMENT

INSTRUCTIONS

REMOVING AND REPLACING WELDED-ON COVERS AND TANKS

REMOVING THE WELD

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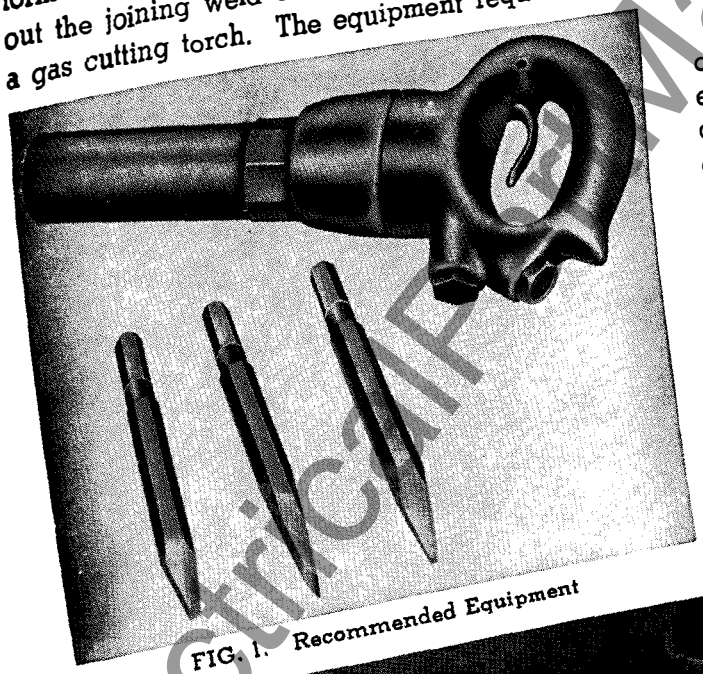

FIG. 1. Recommended Equipment

CHIPPING OUT A WELD

Equipment. The equipment recommended to remove a weld by chipping is:

1. A heavy pneumatic chipping hammer.

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4. Gloves and safety glasses should be worn the operator for his personal protection.

Procedure. It is important to cover any o ings into the tank, to avoid entry of chips. To move a weld by chipping, apply machine grease to the surface of the weld to lubrica cutting. A 3/8 inch diamond-point chisel is the pneumatic hammer and the chisel is that the diamond is pointed into the ro joint. The chisel should cut 1/8" back of th edge of the weld and along the face of the

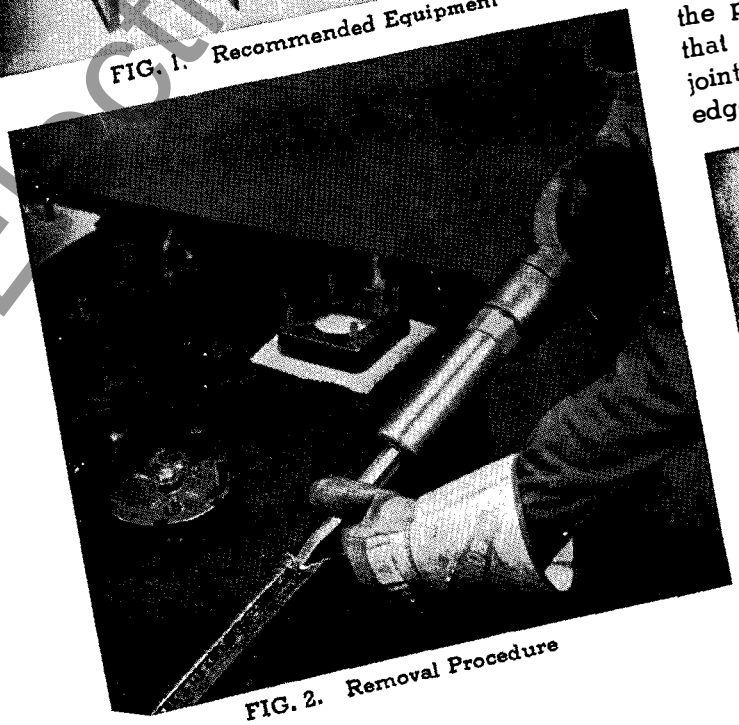

FIG. 2. Removal Procedure

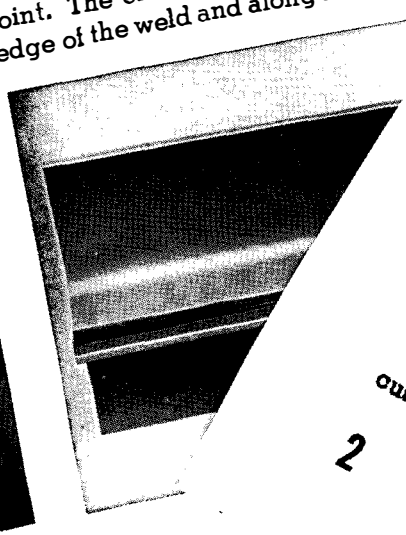

FIG. 4. Carefully Breaking the Seal

flange to remove as much of the weld as possible. Should the weld not be completely removed in one pass with the 3/8 inch diamond-point chisel, more oil or grease should be spread over the remaining weld and the flat chisel used to cut the weld flush with the horizontal and vertical surfaces of the joint. The small diamond-point chisel should then be used to remove any remaining weld metal from the root of the joint.

The flat chisel is then driven directly into root of the joint to crack the seal, as Fig. 4. To prevent the chisel from between the joint and deforming the moved slowly along the joint. A ... he cover or the top section e seal.

WELD REMOVAL

Equipment. The ...ove a weld by ... A heavy d... ...y-acetyle ...Heavy ...Styl...

...number ... ...heavy mac... ...chisel to brea... ...ective equipme... ...gles for safety ... ...en to purge the tr... ...d carbon dioxide fi...

... To remove a weld b... ...rocedure is suggested. ... ...ogen to the filling plug open... ...ce with nitrogen. Keep nitr... ...as space while the weld is bein... ...t the core and coils and to pre... ...ases collecting within the trans...

...ging tip is assembled to the ...as pressures should be ad-

justed to the recommended pressures fo... tip used. Usually 60 to 80 psi oxyg... and 5 to 6 psi acetylene pressure. ... lighted and the flame adjusted t... flame. Heat the weld at one ... to a white heat, then simult... in motion along the weld ... oxygen. Move the torc... with an oscillating mo... or two, then backw... to permit the flam... weld metal fro... along the we... of the cut ... weld is ...

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EQUIPMENT • PROCEDURE

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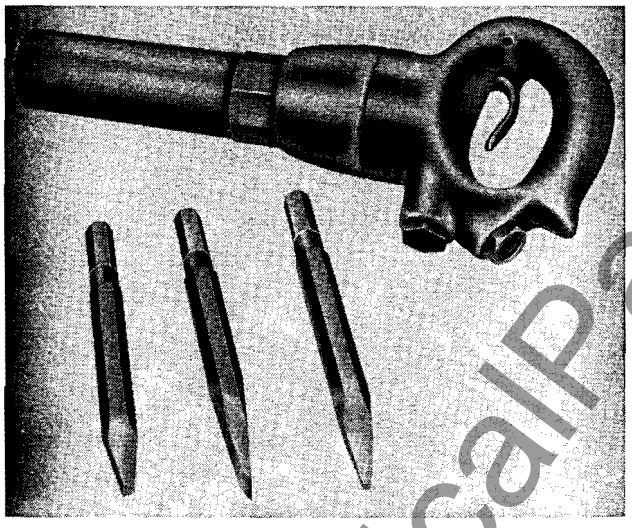

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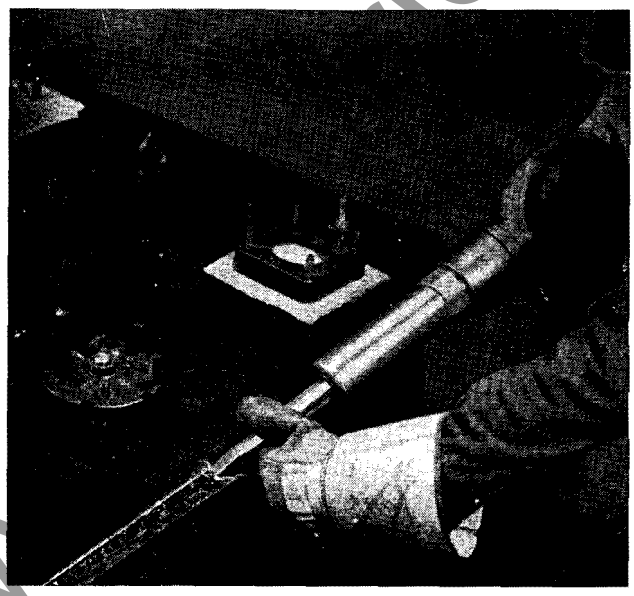

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3. Flat chisels. The flat chisel should have the flat side relieved 1/64", approximately 1/8" back from the cutting edge. This prevents the chisel from "digging-in" and allows the operator better control of its cutting.

4. Gloves and safety glasses should be worn by the operator for his personal protection.

Procedure. It is important to cover any openings into the tank, to avoid entry of chips. To remove a weld by chipping, apply machine oil or grease to the surface of the weld to lubricate the cutting. A 3/8 inch diamond-point chisel is used in the pneumatic hammer and the chisel is held so that the diamond is pointed into the root of the joint. The chisel should cut 1/8" back of the vertical edge of the weld and along the face of the horizontal

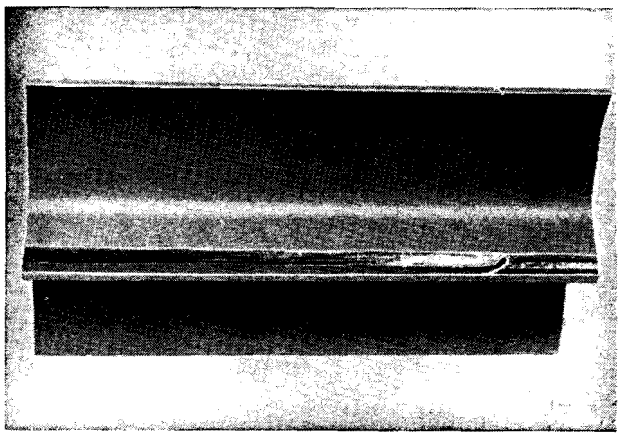


FIG. 3. Weld Partially Removed

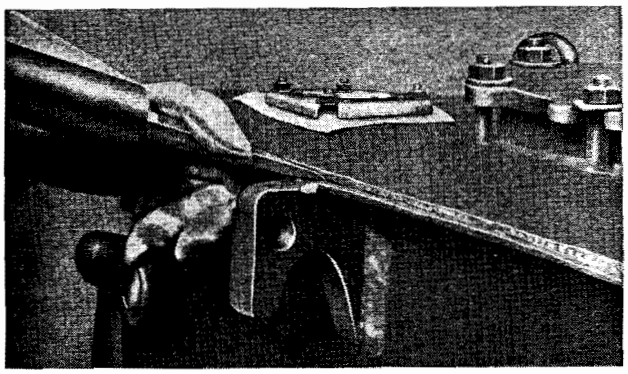


FIG. 4. Carefully Breaking the Seal

flange to remove as much of the weld as possible. Should the weld not be completely removed in one pass with the 3/8 inch diamond-point chisel, more oil or grease should be spread over the remaining weld and the flat chisel used to cut the weld flush with the horizontal and vertical surfaces of the joint. The small diamond-point chisel should then be used to remove any remaining weld metal from the root of the joint.

The flat chisel is then driven directly into the root of the joint to crack the seal, as shown in Fig. 4. To prevent the chisel from being driven between the joint and deforming the plates, it is moved slowly along the joint. A lifting force upon the cover or the top section will help to break the seal.

WELD REMOVAL BY GAS CUTTING

Equipment. The equipment recommended to remove a weld by gas cutting is:

1. A heavy duty gas cutting torch, preferably of the oxy-acetylene type.

2. Heavy duty flame cutting tips or Airco #6 or #8, Style 183 or Oxweld #19, Style 1511 gouging tips.

3. A number of C-clamps.

4. A heavy machinist's or pneumatic hammer and a flat chisel to break the weld seal.

5. Protective equipment such as gloves and colored goggles for safety protection of the operator, nitrogen to purge the transformer tank and hand operated carbon dioxide fire extinguishers.

Procedure. To remove a weld by gas cutting the following procedure is suggested. Connect a bottle of dry nitrogen to the filling plug opening and flush the gas space with nitrogen. Keep nitrogen flowing into the gas space while the weld is being removed to blanket the core and coils and to prevent combustible gases collecting within the transformer case.

The cutting or gouging tip is assembled to the cutting torch. The gas pressures should be adjusted to the recommended pressures for the size tip used. Usually 60 to 80 psi oxygen pressure and 5 to 6 psi acetylene pressure. The torch is lighted and the flame adjusted to give a neutral flame. Heat the weld at one corner of the tank to a white heat, then simultaneously set the torch in motion along the weld and release the cutting oxygen. Move the torch axially along the weld with an oscillating motion, forward slowly an inch or two, then backward quickly about one-half inch, to permit the flame to fan out and wash the molten weld metal from the root of the joint. Continue along the weld in this manner, gauging the depth of the cut so that the entire cross-section of the weld is removed in one pass.

Apply C-clamps to clamp the side or sides from which the weld has been removed to prevent the joint opening prior to complete weld removal.

After the weld has been removed completely around the tank, remove the C-clamps and drive the flat chisel directly into the root of the joint to break any remaining weld seal, as shown in Fig. 4.

REPLACING A WELDED-ON COVER

To replace a welded-on cover that has previously been removed as described above, the following is recommended:

Preparing the Cover for Replacement.

1. Chip or grind any irregularities around the cover edge left during the weld removal operation when the cover was removed from the case. The cover edge should be square and expose clean metal.

2. Clean the underside of the cover three inches back from the cover edge to a smooth surface. A disc grinder is recommended for this operation.

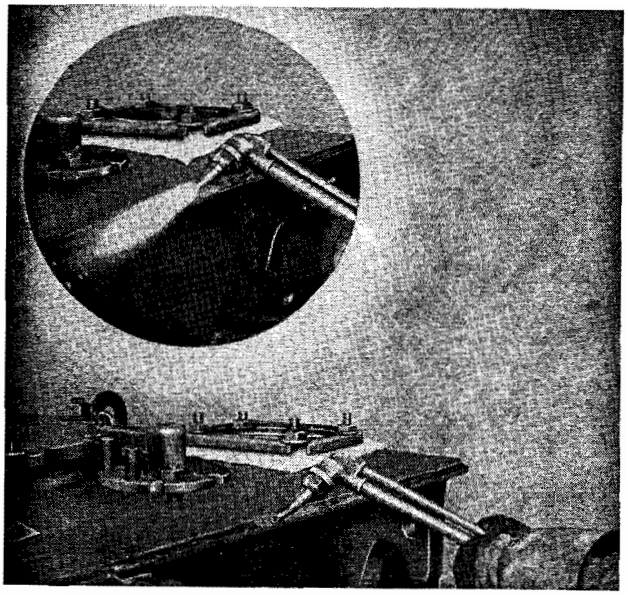


FIG. 5. Removing Weld by Gas Torch

3. Remove and wipe all foreign material from the cover, especially from the underside to prevent dirt falling into the transformer when the cover is placed in position on the transformer case.

Preparing the Case Flange to Receive the Cover.

1. Place a blanket of clean paper or cloth over the entire transformer a few inches below the case flange. This blanket should be attached and continuously sealed with wide masking tape around the entire interior of the case. This is necessary to prevent any foreign material falling into the transformer.

2. Remove any raised irregularities from the top surface of the flange by chipping or grinding. A sanding disc will do the job very effectively, or a grinder may be used; in either case, it should be used so that the material removed from the flange will be thrown away from the transformer case rather than into it. This surface must be smooth to permit the cover to fit tightly and uniformly around the case.

3. Gently brush cuttings and debris collected on the blanket over the transformer to the center of the blanket. Remove this debris, then carefully pull the sealing tape from the case walls to free the blanket. Make certain that the edges of the blanket are kept above the center of the blanket at all times so that any foreign material on the blanket will not roll into the transformer.

Applying the Asbestos Sealing Gasket to the Case nange.

1. Brush a 1/2" wide coating of #7386 red cement 1 1/2" to 2" back from the edge of the flange completely around the case. Care must be observed to prevent any cement extending onto the weld area as it will cause weld porosity.

2. Place a 1/8" diameter asbestos rope #3879 completely around the case flange in the center of the freshly applied cement. There must not be any openings in the gasket. Use a good butt joint, or allow one end to extend a little in back of the other.

Positioning the Cover and Preparing for Welding.

1. Lower the cover onto the case flange so that it is in its approximate final position without sliding across the asbestos gasket. Normally the flange will extend approximately 1/2" beyond the cover edge.

2. Clamp the cover and flange tightly together around its entire periphery with C-clamps. Place the C-clamps near the edge of the cover so that the welding operator can weld under the clamps. The cover edge should be tight against the flange before any welding is done at that point.

Welding the Cover to the Flange.

1. Cover all openings in the cover.

2. Apply a 1/8" fillet sealing weld around the

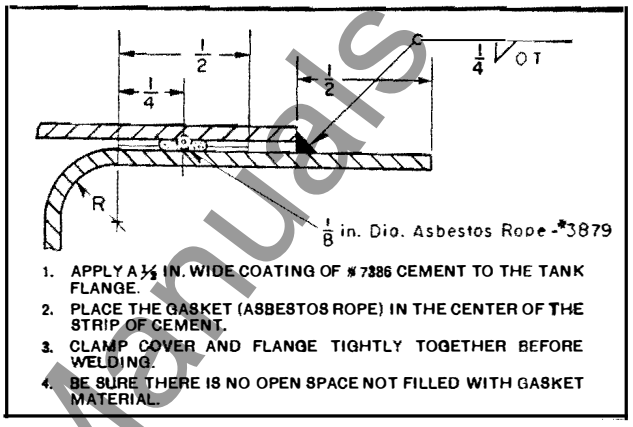


FIG. 6. Method of Joining Cover to Flange

cover starting at one corner of the case and welding around it. Use Westinghouse 5/32" diameter DH-coated electrodes (#972 076 for 50# packages). This is an American Welding Society Type E-6020 electrode and is recommended for horizontal fillets or downhand welding. It is recommended for this weld because of its high penetrating properties. Either a-c or d-c (reverse polarity preferred) current may be used with a current setting of 155 to 175 amperes.

3. Remove the C-clamps from the cover and flange.

4. Remove the slag from the weld bead and wire brush.

5. Weave a 1/4" fillet weld over the 1/8" fillet weld using Westinghouse 5/32" diameter FP electrodes and a welding current of 150 to 160 amperes. This electrode (S#1528 912 in 50# packages) is also a coated electrode. It is an American Welding Society Type E-6012 and may be used with a-c or d-c (straight polarity preferred) current.

6. Clean the slag from the weld and brush.

Paint the weld, the flange and the edge of the cover with primer and touch-up paint.

FORM-FIT TANK TOP SECTIONS

To replace the top section of a form-fit tank that has been previously removed as described above, the following is recommended:

Preparing the Top Section for Replacement.

1. Chip or grind any remaining irregularities left along the bottom face and edge of the flange

of the top section. The flange edge should be square and expose clean metal. The bottom side of the flange should be smooth.

2. Wipe all foreign material from the flange.

Preparing the Flange of the Bottom Section to Receive the Top Section.

1. Wrap and attach with masking tape an 8″ to 12″ wide strip of heavy paper or cloth around the iron directly above the flange.

2. Remove any irregularities from the top surface of the flange by chipping or grinding. When grinding, one should use the grinder so that the material removed is thrown away from the transformer rather than against the iron core. Brush and wipe all foreign material from the flange with a dry cloth. This surface must be smooth to permit the top section to fit tightly and uniformly around the case.

3. Remove the 8″ to 12″ wide protecting material previously placed around the iron.

Applying the Sealing Gasket to the Flange of the Bottom Section.

1. Brush a 1½″ wide coating of #7386 red cement 2″ back from the edge of the flange of the bottom section. Care must be observed to prevent any cement extending onto the weld area as it will cause weld porosity.

2. Place the sealing gasket #1598 upon the freshly applied cement with the tape edges outward, completely around the flange. There must not be any openings in the gasket. Use a good butt joint or allow one end to extend a little in back of the other.

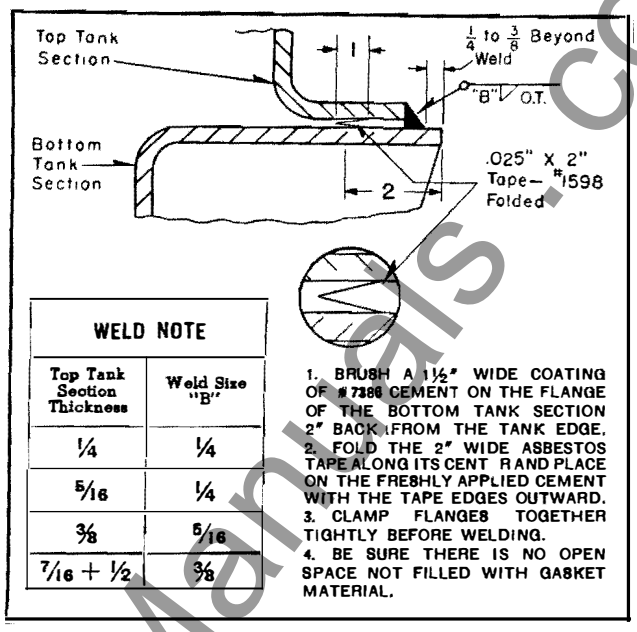
Positioning the Top Section and Preparing for Welding.

1. Lower the top section slowly over the transformer assembly until it is seated on the flange of the bottom section.

2. Clamp the flanges of the top and bottom sections together tightly around its entire periphery with C-clamps. Place the C-clamps near the edge of the flange so that the welding operator can weld behind the C-clamps. The two flanges must be tight together before any welding is done at a given point.

Welding the Top Section to the Bottom Section.

1. Apply a 1/8″ fillet sealing weld around the top section starting at one corner of the case and weld around it. Use Westinghouse 5/32″ diameter DH-coated electrodes S#972 076 for 50# packages.



WELD NOTE	
Top Tank Section Thickness	Weld Size "B"
¼	¼
5/16	¼
⅜	5/16
7/16 + ½	⅜

1. BRUSH A 1½″ WIDE COATING OF #7386 CEMENT ON THE FLANGE OF THE BOTTOM TANK SECTION 2″ BACK FROM THE TANK EDGE.
2. FOLD THE 2″ WIDE ASBESTOS TAPE ALONG ITS CENT R AND PLACE ON THE FRESHLY APPLIED CEMENT WITH THE TAPE EDGES OUTWARD.
3. CLAMP FLANGES TOGETHER TIGHTLY BEFORE WELDING.
4. BE SURE THERE IS NO OPEN SPACE NOT FILLED WITH GASKET MATERIAL.

FIG. 7. Joining of Flanges, "Form-Fit" Tank

This is an American Welding Society Type E-6020 electrode and is recommended for horizontal fillets or downhand welding. It is recommended for this weld because of its high penetrating properties. Either a-c or d-c (reverse polarity preferred) current may be used with a current setting of 155 to 175 amperes.

2. Remove the C-clamps from the cover and flange.

3. Remove the slag from the weld bead and wire-brush.

4. Weave a 1/4″ fillet weld over the 1/8″ fillet weld for top sections made of 1/4″ and 5/16″ thick plate, a 5/16″ weld for 3/8″ thick top sections and a 3/8″ weld for 7/16″ or 1/2″ thick top sections. Deposit this weld with Westinghouse 3/16″ diameter FP electrodes and a welding current of 190 to 210 amperes. This electrode is a coated electrode S#1528 913 in 50# packages. It is an American Welding Society Type E-6012 and may be used with a-c or d-c (straight polarity preferred) current.

5. Clean the slag from the weld and brush.

6. Paint the weld and the flanges with primer and touch-up paint.

WELD AT BOTTOM OF TANK WALL

Many transformer designs will have a bottom weld between the tank wall and the tank bottom. This arrangement, which is not of the form-fit design, is illustrated in Fig. 8. It is necessary to remove this

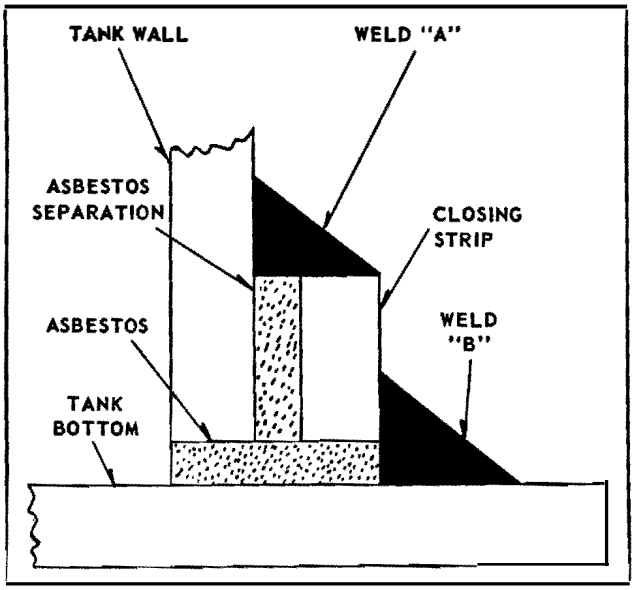


FIG. 8. Weld between Tank Wall and Tank Bottom

weld to lift the tank away from the bottom so that the core and coil assembly can be removed. Because of limited space beneath the coolers it is recommended that the weld be removed by gas cutting.

Removing a Weld at the Bottom of the Tank.

The procedure for the removal of a bottom weld is similar to removing a welded-on cover by gas cutting except as follows:

1. Weld "A" of Fig. 8 must be removed, not weld "B". This is to prevent the gas flame from reaching the oil that has dripped from the core and coil assembly and collected on the tank bottom.

2. Remove the weld completely as well as approximately 1/8" of the closing strip to insure adequate separation between the closing strip and the tank wall.

3. Use on Oxweld #13, Style 1511 tip, directing the flame in the direction of the weld as shown in Fig. 5.

4. Remove the tank from the bottom by lifting after all the internal connections between the core and coil assembly and tank are removed.

Repaciag Taak aad Wed.

1. Before replacing the tank on the base, remove irregularities from the tank surface and the inside of the closing strip by grinding.

2. After replacing the tank, close up the clearance between the tank wall and closing strip. This is to be done by calking with 3/16" diameter asbestos rope #3879 all around the tank. Care should be taken that there are no asbestos fibers protruding that might produce a defective weld.

3. Proceed with welding the tank wall to the closing strip using the same method as specified in welding the cover to the flange, except that clamping is not required.

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