INDEX - MICROFILM REEL 194
(Original designation Navy 5856-1)

PART No. 1
SYNTHETIC LUBRICATING OILS - ESTERS

Doc. No. | Part No. 1 (Synthetic lubricating oils) Cont'd. | FRAME NOS.

30001-30107

7 Blueprint of drawing without number, of 1938 - flow sheet of synthetic lube oil plant from ethane C_2H_6 and methane, through ethylene C_2H_4.

8 Blueprint of drawing M6013-1 of December 1943, Leuna - flow sheet of lube oil treatment.

9 Blueprint of drawing M3184-1 for Building Me-981, Leuna 1942 - Sketch of the T-plant, starting with adipic acid and benzol sulfgas.

10 Blueprint of drawing M4380d-1 of October 1941, Leuna flow sheet titled "Sketch of the E-oil plant Me 981, 2000 tons per year."

11 Blueprint of drawing M5445-1 of October 1942, showing flow diagram and location of measuring instruments for the E-oil plant.

12 Blueprint of drawing 3546-1 of 1942, flow diagram of oil plant in Building Me 126.

13 Blueprint of drawing M4407-1 of July 1941, flow diagram of the E-oil plant, 200 tons per month, showing esterification, washing, distillation, and blending of lube oil.

14 Blueprint of drawing M6017-1 of December 1943, Building Me 955, Leuna - "Sketch of thermal cracking plant" flow sheet of the ethylene - lube oil process with list of detail drawings.

15 Blueprint of drawing M6013-1 of December 1943, Building Me 124. "Sketch of the mix-polymerization plant Me 124" for the preparation of lube oils - flow sheet.

16 Blueprint of drawing M7564-2, 1940 - Paraffin plant, Building Me 458 - 2 tons per month.

17 Blueprint of drawing M3952-1 of 1941. Sketch of the M4 Plant, Building Me 924 for polymerization - location of measuring instruments.

18 Blueprint of drawing M5607-4 - cracking tests - sketch of middle oil cooling in the gas phase - Building M 499.

19 Blueprint of drawing M10468-2 of 1942. E-oil plant - preparation of Ester 515, Building Me 1016.

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20	Blueprint of drawing M10466-2 of 1942. E-oil plant - preparation of Ester 623, Building Me 1016.	
21	Blueprint of drawing M10467-2 of 1942. E-oil plant - preparation of Ester 426, Building Me 1016 - with a typewritten note by Fischer on Esters 504 - 515 - 623 and 426, dated October 19, 1942.	
22	Blueprint of drawing M10469-2 of 1942. E-oil plant - preparation of Ester 504, Building Me 1016.	
23	Blueprint of drawing M2645-1 - general flow sheet of the polymerization process in Building Me 126.	
24	Blueprint of drawing M5969-1, Leuna, November 1943. Building Me 942 - "Flow sheet of the Linde plant" for the synthetic oil preparation - flows of CH_4, C_2H_4 and C_2H_6 and list of detail drawings.	
25	Blueprint of drawing M 5956-1, Leuna, October 1943. Building Me 942 - "Flow sheet of the cracked gas washing plant" for the preparation of synthetic oil 900 - with list of detail drawings.	
26	Blueprint of drawing M5033-2, Leuna, of 1938. Building Me 944 - "Flow sheet of paraffin removal plant."	
27	Blueprint of drawing M9012-4, Leuna, 1943. Building Me 493 - Sketch of the polymerization plant for a pressure of 25 atm.	
28	Blueprint of drawing M2834-1, Leuna 1939. General sketch of the propane plant and paraffin removal - showing safety features in Building Me 944.	
29	Blueprint of drawing M2921-1, Leuna, 1939 - Sketch of the paraffin separation plant with asphalt removal	
30	Blueprint of drawing M5822-2, Leuna, 1939. Research installation on lube oils in Building Me 96a, with crotonic aldehyde, benzol and acetic acid.	
31	Blueprint of small sheet 0/1117 of August 1941 for the preparation of low pour oil at Schkopau.	
32	Five-page typewritten report of Dr. Lowenberg dated Leuna 14 Nov. 1941, on Ester oils, at Schkopau, prepared from methyladipic acid.	

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33	Two-page typewritten report by Dr. Metzger of Leuna 22 Jan. 1942, and one flow sheet, on the preparation of synthetic cutting oil S_1 by mixture of two esters.	
34	Sketch O/1182 of February 1942 on the preparation of cutting oil with adipic acid, isobutylaldehyde and soda wash.	
35	Typewritten report, two pages, with sketch L2-5198-8, of 7-8-42 Leuna, by Eng. Schwale on the preparation of synthetic oil E - with esters 426 and 515.	
36	Typewritten sheet on "cutting oil" and on "transformer oil" 19 November 1942, Leuna.	
37	Typewritten data on Ester - Leuna - 10-8-42 type $R_1OOC-(CH_2)_4-COO\,R_2$.	
38	Blueprint of drawing M5202-1 of 1942 - Sketch of esterification - high-pressure steam flow sheet.	
39	Blueprint of drawing M5068-1 of November 1942 - Leuna, Building Me 1016 - E-oil plant. Washing flow sheet for esterification with esters 623, 426, 515 and 504.	
40	Report #5475/44 VI-S of the Physico-Technical Reichs Institute, Berlin-Charlottenburg of 4 May 1944. "Research on the boundary lubrication of an aluminum-silicon alloy"- 7 pages and 6 charts.	
41	Seven typewritten pages and four tabulations by Dr. Metzger Leuna - 10 March 1942 - on the Ester plant at Leuna.	
42	I. G. 3 page report of 15 February 1944 -Ludwigshafen - on the preparation of esters, in prepration for a patent application.	
43	I. G. 4 page report of 19 June 1942, Ludwigshafen, on the preparation of esters, for a patent application.	
44	Four-page report by Dr. Hanisch, Leuna, 21 July 1943, on the preparation of various esters and some inhibitors at Leuna, Schkopau, and Heydebreck 2.	

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45 Correspondence on "Corrosion inhibitor" of formula $R-X-(R_1-COOH)n$. R and R_1 being aliphatic saturated or cyclic hydrocarbon residues of at least 6 C/atoms, X being the group $-SO_2N<$ or another group containing $CO-N<$ or $-C-S-N<$ N=1 or 2; the group $X-(R_1-COOH)2$ being bound to R once or several times, dated April 1943. I.G. Frankford Am Main-Hochst and up to November 1944. Symbol = KSE, used in aviation gasoline.

46 Letter of 25 August 1944 from Physico-Technical Institute Berlin to Dr. Zorn, Leuna on ester oils and their value on boundary lubrication.

47 Group of two typewritten notes on ester preparation by Dr. Zorn, 1941.

48 Blueprint of drawing M3255-I of April 1941, Building Me 981 at Leuna - flow sheet for the preparation of synthetic oils, esterification, washing, distillation, raffination and blending.

Part No. 2 — 30108-30307

Doc. No. | INHIBITORS; CRUDE OIL DATA; AVIATION GASOLINE I.

PART ONE - Inhibitor Plant.

1 A folder of calculations, charts and data from the I. G. Farbenindustrie A. G. dated 23 November 1942 at Leuna, about the proposed inhibitor plant of a capacity of 3.2 tons per month. Sketch 924103 is attached. The following are detached but part of the report:

2 Blueprint of Sketch 45 dated Feb. 1943 - flow sheet of plant.

3 Blueprint of drawing M-11368-2 July 1943. Flow sheet of inhibitor plant for 3.2 tons per month, in 3 loads per month.

4 Ditto - revised M-11368-C-2.

5 Blueprint of drawing M-5882-1 Oct. 1943. Piping flow sheet for Building Me 1016-M, with list of detail drawings of equipment.

6 Blueprint of drawing M-5583-1 of July 1943 - Leuna - Building and location of apparatus for inhibitor plant Me 1016-M.

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FRAME NOS. 30108-30307

Part No. 2 - Cont'd.

PART TWO - Data on European Oils
(All dated at Leuna, October 1942.

7 Russian crude oil data on the 1939 Russian oil situation, quantities and specifications of various products from the various Russian fields.

8 Data on the conquered Maikop oil field.

9 Possible yield of crude oil in the Ural-Volga fields.

10 Notes on Hungarian crude oil.

11 Analyses of crude oil and byproducts of six various German fields: Heide, Nousiede, Pechelbronn, Fistersdorf, Nienhagen, and Reitbrook,

12 Blueprint of drawing N-3757-2 I.G. Ludwigshafen of 1936 - flow diagram of the oil hydrogenation plant of the A.N.I.C. (Italian) with Albanian Pacura Oil.

PART THREE - Aviation Gasoline.

13 Report No. 363 of the I. G. Farbenindustrie A.G., Leuna, Feb. 1943, by Dr. Welz "The hydroforming process," for aviation gasoline. 46 pages of text, 25 curves, 43 tabulations, and blueprint of drawings M-3392-8 of plant I at low temperature and plant II at high temperature.

14 Flow sheet and balances of the H.F. plant at Moosbierbaum - blueprint of drawing M7748-4 of 1944.

15 Blueprint of drawing M6857-2 of December 1939 - Leuna, Sketch of the hydroforming plant, Kellogg process.

16 Photostat of sketch 08-183a of 1943 of the AROBIN plant (aerobenzin) otherwise unidentified.

17 Blueprint of drawing M-7082-2 of March 1940. Leuna location of the measuring instruments in the hydroforming plant.

18 A 10 page paper by Dr. Kaufmann, Leuna, December 1941, on the H-F process and the Moosbierbaum plant, but no interest because all pictures and curves are missing.

19 Blueprint of drawing M-8541-2, Leuna, March 1941. Flow sheet of the H-F (hydroforming) plant for Leuna for a proposed capacity of 24 M^3 of aviation gasoline per hour.

20 Blueprint of drawing M3515-1 - July 1940 - Leuna - General diagram of the H. F. Catalyst treatment indication of all the equipment and numbers of the detail drawings.

21 Blueprint of drawing M-5356-1 of February 1943 - diagram of the Hauber cracking plant and the copper solution wash.

22 Blueprint of drawing M1556-8 undated, of I. G. Leuna - showing flow diagram of gas and liquids.

23 Blueprint of drawing M6155-2 of Leuna, June 1939 - sketch of the isolentyl-oil-polymerization.

24 Blueprint of drawing M5168-1 - Leuna 1942 - diagram of the Hauber cracking plant at Leuna, Building Me 955, with location of measuring instruments.

25 Blueprint of drawing M3411-1 - Leuna, June 1940 - details of the regenerator oven and its distribution mechanism.

26 Blueprint of drawing M3402-1 - Leuna, June 1940 - assembly drawing of the regenerator.

27 Blueprint of drawing M-7442-2, Leuna, June 1940 - flow diagram of regenerator and data on apparatus (size, temperature, volume, etc.).

28 Blueprint of drawing F.Z.A. 34 of Building Me 388 - detail of construction of the refractories of the oven with the newly developed "Tulip grate."

29 A folder of 7 letter-size blueprints - numbers M-2004-16, M-2171-16, M-2166-16, M-2167-16, M-2168-16, M-2169-16, M-2170-16, concerning the ethane cracking plant in Building Me 388 at Leuna 1937, giving drawing numbers of all details.

30 A letter-size tracing of December 1937, giving the sketch of the testing plant for ethane cracking as per Dr. Hauber.

The following pertain to the discovery in 1937 of the so-called "Tulip-type grate" for the ethane-cracking oven, by Dr. Klein of I. G. Farbenindustrie:

31 Patent application 12196 - History of the invention.

32 Two-page application 0Z12196 - Tulip grate, and 5 photostats numbers: FZA 3a, 15, 22, 23, and 25a (2 of each), showing various sections of the Tulip grate.

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Part No. 3

30308-30315

AVIATION GASOLINE II

1 Blueprint of drawing M3040-1 of 1939 - diagram for an industrial installation of T-52 at Politz for 12,000 tons per year.

2 Blueprint of drawing M2991-1 of 1939 - diagram for an industrial installation of T-52 at Scholven for 22,000 tons per year.

3 Blueprint of drawing M6818-2 of 1940 - Leuna - piping diagram for synthetic gasoline, Building Me 958. T52 plant at Leuna.

4 Blueprint of drawing M3364-1 of August 1940 - diagram of the plant for a production of 19,000 tons per year of T52 - Sheet #1 - dehydrogenation

5 Ditto - Sheet #2 - Compressors, condensers, coolers, and oil wash.

6 Ditto - Sheet #3 - Gas removal from the wash oil.

7 Ditto - Sheet #5 - Pressure polymerization.

Part No. 4.

AVIATION GASOLINE III

HYDROGENATION UNDER PRESSURE

DHD-Druck-Hydrier-Distillation

30316-30331

1 Flow sheet, undated and unidentified of the DHD process for gasoline production.

2 Blueprint of drawing M-7689-4, 1941 Leuna - Sketch of the redistillation of DHD gasoline in the 30-tray column, Building Me 821c.

3 Blueprint of drawing M8626-4, 1942 Leuna - Sketch of the redistillation of DHD gasoline in Building Me 821. This drawing is more general than the preceding one.

4 Blueprint of drawing M10049-4, 1944 Leuna - redistillation of the DHD gasoline in Me 821, different column.

5 Blueprint of drawing M9000-4, 1943, Leuna - proposed plan for the removal of gas oil in connection with the DHD plant.

Doc. No. | Part No. 4 - Cont'd. | FRAME NOS. 30316-30331

6 Blueprint of drawing without number from Leuna 1944. Flow sheet of the proposed DHD plant for the preparation of light gasoline from stripper gasoline and gasoline and gasoline from various other origins.

7 Blueprint of drawing M8854-2 Leuna, 1941 - sketch of the cycle of the D H D process.

8 Blueprint of drawing M 8963-2 Leuna, 1941 - same as M-8963-2 with some changes; and indication of sizes of pipings.

9 Blueprint of drawing M10518-2, Leuna, 1942 - perspective view of the DHD ovens, piping connections and location of measuring instruments.

10 Blueprint of drawing M-10601-2, Leuna 1942 - perspective view of the DHD expansion plant, with three large expansion tanks, and piping connections.

11 Blueprint of drawing M-11163-2, Leuna, 1943 - flow diagram of the DHD plant.

12 Blueprint of drawing M12343-2, Leuna, 1944 - latest flow sheet of the DHD plant.

13 Blueprint of drawing M-5006-4, Leuna, 1939 - sketch of the gasoline washing plant in Me 826b (a caustic washing).

14 Blueprint of drawing M5158-4, Leuna, 1939 - sketch of the gasoline washing plant with removal of condensed oil.

15 Blueprint of drawing M5252-4, Leuna, 1939 - sketch of the gasoline washing plant in Me 826a and 826c (caustic washing).

Doc. No. | Part No. 5. | 30332-30583

DIESEL OIL, FUEL PRODUCTION AND TESTS
REPORTS ON VARIOUS FUELS

1 Thesis of Dr. Kneule, 1937, at the Technische Hochschule Munich: "Report on the investigation of the combustion process in the high-speed Diesel engine" - 62 pages.

Doc. No.	Part No. 5 - Cont'd.	FRAME NOS. 30332-30583

2 Report #370 of I. G. Farbenindustrie A. G. Oppau of February 1939: "Research on the combustion process in the Hesselman engine with the I. G. piezometric quartz cathodic ray indicator. Six pages of text and 9 of figures.

3 Report #386 of I. G. Farbenindustrie A.G. Oppau of June 1939: "Influence of the injection quantity, cooling temperature, RPM, and condition of air on the combustion process in the Diesel engine" - 13 pages of text and 14 pages of pictures and data.

4 Report of tests of the Automotive Institute of the Air Corps Academy, Berlin Gatou, of 15 September 1941 on: "Study of injection nozzles and use of information obtained from March to August 1941 - 19 pages of text and 11 of pictures.

5 Three-page report Ludwigshafen I.G. 1943. Tests on the preparation of special fuels - (1) nitration of hydrocarbons and phenols; (2) cold resistance of nitrated aromatics in gasoline; (3) cold resistance of hydrogenation products.

6 Report by A. D. Petrow (Bulletin de l'Academie des Sciences de l'URSS. 1941). 5 pages of text and tables. Knock resistance and pour points of individual hydrocarbons used in Diesel fuels.

7 Report by Oettinger, Ludwigshafen, June 1941, on "Diesel fuel production in the coal hydrogenation plants" - 4 pages of text and 2 tables.

8 Copies of data on various Diesel fuels of various origins - brown coal tars and diluents, physical properties and cetane numbers - I. G. 1938.

9 Two-page report by Fromberg - Ludwigshafen, 1941. "Comparison of engine output with oxygen and with N_2O."

10 Reprint of article of Dr. Penzig (I.G. Farben) on the "Ring Verfahren" (N_2O in air of aircraft engines) 1943.

11 Reprint of article by O. Lutz Brunswick, 1943, on "Fundamental questions on the use of oxygen carriers for the supercharge of aircraft engines."

12 Reprint of article by H. Triebuigg, Berlin, 1943, on: "Single cylinder tests with internal cooling."

Doc. No. | FRAME NOS. 30332-30583

Part No. 5 - Cont'd.

13 Reprint of article by O. Holfelder, Berlin-Gatow, 1943, on: "Engine operation with safety fuels."

14 Blended Diesel fuels and coal tar oil. Reprint of article in "Oel and Kohle" - December 1938.

15 Reprint of article on "Standardized testing method for Diesel and for Otto fuels on the basis of ignition delay," by H. Ernst and O. Widmaier of the Technische Hochschule, Stuttgart - 1940.

16 Reprint of article by Dr. Wiedmaier in "Oel and Kohle" in 1939 - on "Research on Diesel fuels by various testing methods" - 5 pages.

Part No. 6. 30584-30718

TECHNICAL DATA

This book consists of single sheets of engineering data bound together by "Ruhrchemie" at Oberhausen, for the use of their draftsmen and engineers. It covers the following fields:

A. Construction Drawings
- Drawing symbols
- Threads & screws
- Pipes & nipples
- Drives - pulleys - belts - gears
- Railroad equipment

B. Calculation Data
- Materials
- Resistance
- Energy and its use
- Heat
- Thermodynamics
- Physics
- Miscellaneous

Doc. No. | Part No. 7. 30719-30775

METHANOL AND ISOBUTYL OIL SYNTHESIS

1 An 11-page bibliography on the subject of methanol and other high molecule alcohols from CO and H_2O, from the Leuna Library - 1943.

2 A calculation sheet and 2 curve sheets on the reaction $2CO + 4H2 \rightarrow C2H4 + 2H2O$, Leuna 1942.

Doc. No.	Part No. 7 - Cont'd.	FRAME NOS. 30719-30775

3 Data (typewritten) on the history of methanol synthesis in Germany and other countries with a list of patents of Dr. M. Pier since 1923 - 9 sheets.

4 Blueprint of drawing M-9239-2 - 1941 - Sketch of the CO2 and water pressure washing for the Synol plant at Leuna.

5 Blueprint of drawing M-4798-16 - Sketch of the OXO process (no date).

6 Blueprint of drawing M-3458-16 of 1940 - Sketch of the OXO-test plant - Leuna (2 copies).

7 Blueprint of drawing M-8929-4 of March 1943 - Leuna - Sketch of the ether removal from isobutyl of column IIIA in Building Me 417.

8 Blueprint of drawing M6108-2 of June 1939 - Leuna - distillation plant in Building Me 490 - Isobutyl distillation columns #2 to 7.

9 Blueprint of drawing M5438-4 of October 1939 - Leuna - Sketch of the preparation of pure methanol.

10 Blueprint of drawing M-1682-1 of 1937 - Leuna - Sketch for the preparation of isobutyl to iso-octane.

11 Blueprintof drawing M4799-1 - Leuna, February 1942 - flow sheet of the preparation of synol by-products in Building Me 458 with list of detail drawings.

12 Letter-size photostat, undated - flow sheet of the cycle operation in the methanol and isobutyl oil plant.

13 Letter-size flow sheet of the isobutyl preparation in 1940 Columns 1 to 7, in Building Me 490, and Columns 5 to 7 in Building Me 417.

14 Letter-size photostat - flow sheet of methanol and isobutyl recovery in Leuna - 1939 - #45591.

15 Letter-size photostat of preparation of pure methanol in Building Me 982 - Leuna - undated.

16 Plan view of Building Me 982 at 1:500 scale.

17 Letter-size sketch of September 1940 - flow sheet for methanol.

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18 Blueprint of letter-size sketch 0/996. Project for the construction of an oil pressure vent on the methanol and isobutylol chambers in Me 333.

19 Photostat of letter-size sketch 0/1421 undated, 1450 m/m fractionating column (30 trays) for the separation of dimethylether and light olefins from the raw isobutyl.

20 Photostat of letter-size sketch 0/1014 undated, "Separation of the methanol from the higher molecular water soluble alcohols."

21 Blueprint of drawing O.A. SK2 of July 1942 - New process for the preparation of pure methanol from raw methanol containing ether - flow diagram.

22 Blueprint of drawing M2749-8 - Leuna, December 1939 - sketch for the reaction of methanol and carbon monoxide.

23 Blueprint of drawing M-3539-8 of March 1941, Leuna - sketch of a pure methanol distillation plant for 22.9 tons per day, for Japan, Niton Koggo.

24 Blueprint of a sketch, November 1939, for the production of 50,000 tons per year of air gas and 50,000 tons per year of tanol.

25 Blueprint of drawing M3571-8 of April 1941, Leuna - sketch of a pure methanol distillation plant, a batch proposition, for Niton Koggo.

26 Blueprint of drawing M2450-8 of March 1939 - balance sheet for the production of 50,000 yearly tons of iso-octane and 35,000 yearly tons of gasoline, from mixture of CO + 22H2.

27 Blueprint of letter-size sketch of 1939, Ludwigshafen - on the butyl synthesis.

28 Blueprint of letter-size sketches of 1939 on air gas production, Sketch # III.

29 Ditto - Sketch # IV.
30 Ditto - Sketch # VI.
31 Ditto - Sketch # VII.

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32 Blueprint of drawing M3675-8 of May 1941 - Leuna - Sketch of the distillation of fuels from the middle-pressure synthetic plant - "Auschwitz gasoline" 75,000 yearly tons of gasoline, 7,500 yearly tons of gas oil.

33 Blueprint of drawing 16159 of the Degussa, January 1944 - layout of the testing installation for methanol at Wolfgang.