DWG N°

FG

TO 2K-2 RECYCLE GAS LINE

TO CDW

TO 2-K2

TO VBU V-602

WILD NAPHTHA TO CDU-1

2E-54 EFFLUENT AIR CONDENSER

2E-3 REACTOR EFFLUENT TRIM COOLER

CWR

CWS

0.25

2F-1 HEATER

FUEL GAS

2R-1 REACTOR NOTE 5

2E-1 A/E CHARGE REACTOR/EFFLUENT EXCHANGER

2V-1 SEPARATOR

2E-7 STRIPPER OVHD CONDENSER NOTE 3

0.32

MIN. FLOW

2V-2N STRIPPER OVHD CONDENSER

2P-3 A/B* WILD NAPHTHA PRODUCT PUMP NOTE 2

KHT

NHT

ULTRAFORMER EFFLUENT TO 2E-13

ULTRAFORMER EFFLUENT FROM 2E-14

2C-1 STRIPPER NOTE 4

2E-8 STRIPPER REBOILER NOTE 1

1.25

ULTRAFORMER EFFLUENT TO 2E-15

2E-4 A/B* COLD STRIPPER FEED BOTTOM EXCHANGER NOTE 8

1.3

2P-1A/B CHARGE PUMP NOTE 7

2P-2 CHARGE PUMP NOTE 7

RICH GAS FROM ULTRAFOR.

HEAVY NAPHTHA

KEROSENE

MAKE-UP GAS

2E-91 A/C HOT STRIPPER FEED/ BOTTOM EXCHANGER

2P-91 A/B STRIPPER BOTTOM PUMP NOTE 13

NAPHTHA TO 2P-51

ULTRAFORMER EFFLUENT FROM 2E-13

2E-11 KERO PRODUCT AIR COOLER

0.27

2E-12 KERO PRODUCT TRIM COOLER

0.13

2E-2* KERO PRODUCT AIR COOLER NOTE 10

0.45

2E-53*/2E-26* KERO PRODUCT TRIM COOLER NOTE 10

0.1

FROM LC ON 2C-4

STABILIZER BOTTOMS FROM 2E-21

STABILIZER BOTTOMS TO B.L.

NAPHTHA/KEROSENE PRODUCT TO STORAGE

OVERRIDE

2E-93 MP STEAM SUPERHEATER

2DS-91 STEAM DESUPERHEATER

2E-92 MP STEAM GENERATOR

BFW

MPS

TO FLARE

2F-3 HOT OIL HEATER

2V-7 HOT OIL SURGE DRUM

2P-14 A/B HOT OIL CIRCULATION PUMP

2E-28 HOT OIL COLER

FUEL GAS

CWR CWS

PUMP AND FILL OUT

FROM OTHER USERS

TO OTHER USERS

ISSUED FOR SAFETY STUDY

NOTE 1: HOT OIL AS HEATING MEDIUM DURING NORMAL OPERATION.ULTRAFORMER EFFLUENT IS USED FOR NAPHTHA HDT RUN.
NOTE 2: SERVICE CHANGED FROM STRIPPER REFLUX PUMP FOR NAPHTA HDT RUN TO WILD NAPHTHA PRODUCT PUMP FOR KERO HDT RUN.
NOTE 3: TUBE BUNDLE AND HEADS TO BE REPLACED.
NOTE 4: TRAYS 1 TO 28 TO BE REPLACED FOR REDUCED LOAD.
NOTE 5: NEW REACTOR INTERNALS (HOLD)
NOTE 6: DELETED
NOTE 7: SERVICE CHANGED FROM NAPHTHA TO KERO CHARGE PUMPS. DURING KHT OPERATION 2-P-1A WILL BE SPARED BY 2P-1B RUNNING IN PARALLEL WITH 2P-2 USE OF BOTH 2P-1A AND 2P-1B IS NOT ALLOWED.
NOTE 8: SERVICE CHANGED FROM STRIPPER FEED/ULTRAFORMER EFFLUENT TO STRIPPER FEED/BOTTOM DURING KHT OPERATION.
NOTE 9: DELETED
NOTE 10: SERVICE CHANGED FROM 2C-4 BOTTOM COOLING TO KERO COOLING.
NOTE 11: DELETED
NOTE 12: 2-V-2 TO BE REPLACED BY 2V-2N.
NOTE 13: NOT USED IN KHT OPERATION.
NOTE 14: DELETED

GENERAL NOTES

THE UNIT SHALL BE OPERATED BOTH IN CURRENT AND REVAMPED OPERATIONS (I.E. NAPHTA AND KERO HYDROTREATING).
NORMAL OPERATION IS KERO HDT.
▶◀ VALVE CLOSED DURING KERO HDT RUN.

SOR CASE

Stream no.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Stream description		Kero charge	Make-up gas	Reactor feed	Reactor effluent	Effluent to sep.	Off gas	Kero to preheating	Stripper inlet	Stripper bottom	Stripper ovhd	Ovhd gas	Wild naphtha	Kero product	Hot oil supply	Hot oil return	BFW	BFW desup	Superheat steam
Temperature	°C	40.0	59	308.0	315.0	38.0	38.0	38.0	203.9	250.2	206.8	43.0	43.0	38.0	315.0	240.0	120.0	120.0	220.0
Pressure	barg	0.4	35	30.0	29.7	27.7	27.0	27.0	2.2	2.7	2.2	2.0	2.0	5.0	5.0	3.3	11.8	11.8	10.8
Mass flow	kg/h	39800	668	40462	40462	40462	437	40025	40025	37895	21.30	204	1926	37895	70000	70000	42.42	13.9	4179
Std vol flow	m³/h	50.0	-	-	-	-	-	50.8	48.8	47.8	-	-	2.5	47.8	-	-			
Liq SG /Vap MW		0.796 /-	-/3.7	0.792 /58.0	0.788 /65.6	0.786 /3.0	-/3.0	0.788 /-	0.792 /-	0.793 /-	-/88.0	-/20.9	0.767 /-	0.793 /-	0.867 /-	0.867 /-	1 /-	1 /-	-/18.0
Vapour mass fraction		0	1	0.377	0.409	0.011	1	0	0.066	0	1	1	0	0	0	0	0	0	1
Component wt/																			
H_2		-	50.92	0.83	0.73	0.73	65.29	0.02	0.02	0	0.42	4.41	0	0	-	-	-	-	-
H_2S		-	-	-	0.16	0.16	5.60	0.10	0.10	0	1.82	16.76	0.24	0	-	-	-	-	-
NH_3		-	-	-	0.02	0.02	0.53	0.02	0.02	0	0.28	2.41	0.06	0	-	-	-	-	-
C_1-C_5		-	49.08	0.80	0.84	0.84	27.67	0.55	0.55	0	10.30	73.32	3.64	0	-	-	-	-	-
Kerosene		100	-	98.36	98.19	98.19	0.88	99.26	99.26	99.97	86.50	2.32	95.40	99.97	-	-	-	-	-
Naphtha		-	-	-	0.06	0.06	0.04	0.06	0.06	0.03	0.67	0.77	0.66	0.03	-	-	-	-	-

EOR CASE

Stream no.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Stream description		Kero charge	Make-up gas	Reactor feed	Reactor effluent	Effluent to sep.	Off gas	Kero to preheating	Stripper inlet	Stripper bottom	Stripper ovhd	Ovhd gas	Wild naphtha	Kero product	Hot oil supply	Hot oil return	BFW	BFW desup	Superheat steam
Temperature	°C	40.0	59	(342)	(345)	38.0	38.0	38.0	203.9	250.2	206.9	43.0	43.0	38.0	315.0	240.0	120.0	120.0	220.0
Pressure	barg	0.4	35	30.0	29.7	27.7	27.0	27.0	2.2	2.7	2.2	2.0	2.0	5.0	5.0	3.3	11.8	11.8	10.8
Mass flow	kg/h	39800	668	40462	40462	40462	451	40011	40011	37878	21.33	201	1932	37878	70000	70000	42.32	13.9	4179
Std vol flow	m³/h	50.0	-	-	-	-	-	50.8	50.8	47.8	-	-	2.5	47.8	-	-			
Liq SG /Vap MW		0.796 /-	-/3.7	(-/89.5)	(-/94.7)	0.788 /3.0	(-/3.0)	0.788 /-	0.792 /-	0.793 /-	-/88.3	(-/20.8)	0.767 /-	0.793 /-	0.867 /-	0.867 /-	1 /-	1 /-	-/18.0
Vapour mass fraction		0	1	1	1	0.011	1	0	0.066	0	1	1	0	0	0	0	0	0	1
Component wt/																			
H_2		-	50.92	0.83	0.75	0.75	65.70	0.02	0.02	0	0.42	4.46	0	0	-	-	-	-	-
H_2S		-	-	-	0.16	0.16	5.55	0.10	0.10	0	1.79	16.70	0.24	0	-	-	-	-	-
NH_3		-	-	-	0.02	0.02	0.52	0.01	0.02	0	0.28	2.41	0.06	0	-	-	-	-	-
C_1-C_5		-	49.08	0.80	0.84	0.84	27.30	0.54	0.55	0	10.22	73.21	3.65	0	-	-	-	-	-
Kerosene		100	-	98.36	98.16	98.16	0.88	99.25	99.26	99.97	86.52	2.33	95.29	99.97	-	-	-	-	-
Naphtha		-	-	-	0.07	0.07	0.05	0.07	0.06	0.03	0.76	0.89	0.75	0.03	-	-	-	-	-

LEGEND

- EXISTING EQUIPMENT
- NEW EQUIPMENT
- EQUIPMENT TO BE MODIFIED
- CHANGE OF SERVICE
- XX-XX* EQUIPMENT IN DOUBLE SERVICE
- STREAM NUMBER
- SOR/EOR TEMPERATURE (°C)
- PRESSURE (barg)
- SOR/EOR DUTY (MM Kcal/h)
- SOR/EOR FLOW RATE (kg/h)

REV.	DATE	DESCRIPTION	DRAW	BY	CHD	APP.
A02	27/11/04	INCLUDED CLIENT COMMENTS	DVL	MTG	EC	EC
A01	15/10/04	FIRST ISSUE				

CREMONA REFINERY REVAMPING PROJECT
TAMOIL RAFFINAZIONE S.p.A.
CREMONA ITALY

PROCESS FLOW DIAGRAM
ULTRAFINER 2
KERO HDT OPERATION

FOSTER WHEELER ITALIANA

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