

Language to Support Complexity Weighted Barrel (CWB)

CWB Reporting and Verification

CWB Reporting Language and Calculation

Complexity Weighted Barrel (CWB) Calculation.

- (A) *Reporting of CWB Throughput Functions.* The operator must report annual volume in barrels for each applicable throughput in Table 1 of this section, unless other units are listed in column 3 of Table 1 of this section. The percent of coke on the catalyst also must be reported for each catalytic cracking units. Beginning with data year 2013, CWB is considered covered product data and subject to material misstatement.
- (B) *Total facility CWB.* The total facility CWB production must be calculated according to the following formula.

$$CWB = \sum CWB_{Factor} * Throughput$$

Where:

"CWB" = The total amount of complexity weighted barrels from a petroleum refinery.

"CWB_{Factor}" = The CWB factor for each process found in Table 1 of this section.

"Throughput"= The reported value for each CWB function identified in Table 1 of this section reported pursuant to section 95113(l)(43)(A).

- (C) *Catalytic Cracking Correction.* For fluid catalytic cracking, mild residual catalytic cracking, and residual catalytic cracking that result in coke on the catalyst, the following equation must be used in substitution for CWB_{Factor} * Throughput:

$$CWB_{CC} = (A + (B * COC)) * Throughput_{CC}$$

Where:

"CWB_{CC}" = The complexity weighted barrel amount from catalytic cracking.

"A" = The first CWB factor listed in column 4 of Table 1 of this section.

"B" = The second CWB factor listed in column 4 of Table 1 of this section.

"COC" = The percent of coke on the catalyst in the catalytic cracking unit.

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- (D) *Density*. The density of each throughput must be known for purposes of converting each throughput from barrel to mass units. If the throughput has a known density, a default value from a standards table may be used. The default value reference must be retained for verification purposes. If the throughput is not known, the measurements must follow the requirements of section 95103(k).
- (E) *Measurement Accuracy*. All throughputs must follow the accuracy requirements outlined in section 95103(k). No single refinery activity may be reported under more than one CWB function.

CWB Verification Language

Review of Product Data. The verifier's review of product data must include the following, where applicable.

- (A) Verifiers must confirm that data substitutions were not used for covered product data.
- (B) For product data reported by operators of petroleum refineries subject to section 95113:
 - 1. Verifiers must evaluate conformance and material misstatement for 2013 primary refinery products data reported in 2014, and 2014 data reported in 2015. Beginning with 2015 primary refinery product data reported in 2016, verifiers will evaluate for conformance, and will not assess material misstatement.
 - 2. Verifiers must evaluate conformance for Solomon Energy Intensity Index (EII), if applicable, for all data years.
 - 3. Verifiers must separately evaluate conformance and separately assess material misstatement for the total facility complexity weighted barrel beginning with 2013 data reported in 2014
 - 4. Verifiers must submit two product data verification statements for 2013 and 2014 data reports:
 - A. A verification statement that includes the evaluation of primary refinery products and the Solomon EII, as applicable, as well as non-covered product data;
 - B. A verification statement for the evaluation of complexity weighted barrel.
 - 5. Beginning with 2015 data reported in 2016, only a verification statements for the complexity weighted barrel is submitted.

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Table of CWB Values

Table 1 CWB Functions and Factors

CWB unit	Throughput Basis	Unit of Measure	CWB Factor	EIA Number	Process Subtypes
Atmospheric Crude Distillation	Feed	thousands of barrels/year	1	401	Mild Crude Unit, Standard Crude Unit
Vacuum Distillation	Feed	thousands of barrels/year	0.91	402	Mild Vacuum Fractionation, Standard Vacuum Column, Vacuum Fractionating Column, Vacuum Flasher Column,
					Heavy Feed Vacuum Unit
Visbreaker	Feed	thousands of barrels/year	1.6	403	Processing Atmospheric Residual (w/o a Soaker Drum), Processing Atmospheric Residual (with a Soaker Drum), Processing Vacuum Bottoms Feed (w/o a Soaker Drum), Vacuum Bottoms Feed (with a Soaker Drum)
Delayed Coker	Feed	thousands of barrels/year	2.55	405	Delayed Coking
Fluid Coker	Feed	thousands of barrels/year	10.3	404	Fluid Coking
Flexicoker	Feed	thousands of barrels/year	23.6		Flexicoking
Fluid Catalytic Cracking	Feed	thousands of barrels/year	1.150,	407	Fluid Catalytic Cracking (Feed ConCarbon <2.25 wt%)
			Coke-on-Catalyst CWB:		
			1.041		
CWB unit	Throughput Basis	Unit of Measure	CWB Factor	EIA Number	Process Subtypes
Mild Residual FCC	Feed	thousands of barrels/year	0.6593,		Mild Residualuum Catalytic Cracking (Feed ConCarbon 2.25-3.5 wt %)
			Coke-on-Catalyst CWB:		
			1.1075		

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Other FCC	Feed	thousands of barrels/year	4.65		Houdry Catalytic Cracking
Other FCC	Feed				Thermoform Catalytic Cracking
Thermal Cracking	Feed	thousands of barrels/year	2.95	406	Thermal Cracking
Naphtha/Distillate Hydrocracker	Feed	thousands of barrels/year	3.15	439 / 440	Mild Hydrocracking (Normally less than 1,500 psig and consumes between 100 and 1,000 SCF H ₂ /b)
					Severe Hydrocracking
					Naphtha Hydrocracking
Residual Hydrocracker (H-Oil; LC-Fining and Hycon)	Feed	thousands of barrels/year	4.4	441	H-Oil
					LC-Fining™ and Hycon
Naphtha Hydrotreater	Feed	thousands of barrels/year	0.91	420/425/426	Benzene Saturation
					Desulfurization of C ₄ -C ₆ Feeds
					Conventional Naphtha Hydrotreating
					Diolefin to Olefin Saturation of Gasoline
					FCC gasoline hydrotreating with minimum octane loss
					Olefinic Alkylation of Thio Sulfur
					Selective Hydrotreating of Pyrolysis Gasoline/Naphtha Combined with Desulfurization
					Pyrolysis Gasoline/Naphtha Desulfurization
					Selective Hydrotreating of Pyrolysis Gasoline/Naphtha Combined with Desulfurization
					Reactor for Selective Hydrotreating
					S-Zorb™ Process
CWB unit	Throughput Basis	Unit of Measure	CWB Factor	EIA Number	Process Subtypes

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Kerosene Hydrotreater	Feed	thousands of barrels/year	0.75	421	Aromatic Saturation of Kerosene
					Conventional Hydrotreating of Kerosene/Jet Fuel
					High Severity Hydrotreating Kerosene/Jet Fuel
Diesel/Selective Hydrotreater	Feed	thousands of barrels/year	0.9	422 / 423	Aromatic Saturation of Distillates
					Conventional Distillate Hydrotreating
					High Severity Distillate Hydrotreating
					Ultra-High Severity Hydrotreating
					Middle Distillate Dewaxing
					S-Zorb™ Process
					Diolefin to Olefin Saturation of Alkylation Feed
Selective Hydrotreating of Distillates Fuels					
Residual Hydrotreater	Feed	thousands of barrels/year	1.8	424	Desulfurization of Atmospheric Residual
					Desulfurization of Vacuum Residual
VGO Hydrotreater	Feed	thousands of barrels/year	1	413	Hydrodesulfurization/denitrication
					Hydrodesulfurization
Reformer - including AROMAX	Feed	thousands of barrels/year	3.5	430 / 431	Continuous Regeneration, Cyclic, Semi-Regenerative, and AROMAX
Solvent Deasphalter	Feed	thousands of barrels/year	2.8	432	Conventional Solvent, Supercritical Solvent

CWB unit	Throughput Basis	Unit of Measure	CWB Factor	EIA Number	Process Subtypes
Alkylation/Poly/Dimersol	C5+ Alkylate	thousands of barrels/year	5	415	Alkylation with Hydrofluoric Acid
					Alkylation with Sulfuric Acid
	C5+ Product				Polymerization C3 Olefin Feed

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					Polymerization C3/C4 Feed
					Dimersol
C4 Isomer Production	Feed	thousands of barrels/year	1.25	615/644	C4 Isomerization
C5/C6 Isomer Production - including ISOSIV	Feed	thousands of barrels/year	1.8	438	C5/C6 Isomerization
					ISOSIV
POX Syngas for Fuel	Product	millions of standard cubic feet/year ₁	2.75		POX Syngas for Fuel
POX Syngas for Fuel					Air Separation Unit
Sulfur (recovered)	Product Sulfur	thousands of light tons/year	140	435	sulfur Recovery Unit
					Tail Gas Recovery Unit
	Sulfur Sprung				H2S Springer Unit
Aromatics Production (All)	Feed	thousands of barrels/year	3.3	437	Aromatics Solvent Extraction: Extraction Distillation
					Aromatics Solvent Extraction: Liquid/Liquid Extraction
					Aromatics Solvent Extraction: Liq/Liq w/ Extr. Distillation
					Benzene Column
					Toluene Column
					Xylene Rerun Column
					Heavy Aromatics Column
Hydrodealkylation	Feed	thousands of barrels/year	2.5		Hydrodealkylation
Toluene Disproportionation/	Feed	thousands of barrels/year	1.9		Toluene Disproportionation / Transalkylation
CWB unit	Throughput Basis	Unit of Measure	CWB Factor	EIA Number	Process Subtypes
Transalkylation					
Cyclohexane production	Cyclohexane Product	thousands of barrels/year	2.8		Cyclohexane
Xylene Isomerization	Feed	thousands of barrels/year	1.9		Xylene Isomerization

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Paraxylene Production	Paraxylene Product	thousands of barrels/year	6.5		Paraxylene Adsorption
		thousands of barrels/year			Paraxylene Crystallization
	Feed	thousands of barrels/year			Xylene Splitter
		thousands of barrels/year			Orthoxylene Rerun Column
Ethylbenzene production	Ethylbenzene Product	thousands of barrels/year	1.6		Ethylbenzene Manufacture
	Feed	thousands of barrels/year			Ethylbenzene Distillation
Cumene production	Cumene Product	thousands of barrels/year	5		Cumene
Lubricant solvent extraction	Feed	thousands of barrels/year	2.2	815/854	Extraction: Solvent is Duo-Sol, Furfural, NMP, Phenol, or SO ₂
Lubricant solvent dewaxing	Feed	thousands of barrels/year	4.55		Dewaxing: Solvent is Chlorocarbon, MEK/Toluene, MEK/MIBK, or Propane
Lubricant Catalytic Dewaxing	Feed	thousands of barrels/year	1.6		Catalytic Wax Isomerization and Dewaxing, Selective Wax Cracking
Lubricant Hydrocracking	Feed	thousands of barrels/year	2.5		Lube Hydrocracker with Multi-fraction Distillation, Lube Hydrocracker with Vacuum Stripper
Lubricant Wax Deoiling	Product	thousands of barrels/year	11.8		Deoiling: Solvent is Chlorocarbon, MEK/Toluene, MEK/MIBK, or Propane
Lubricant and Wax Hydrofining	Feed	thousands of barrels/year	1.15		Lube Hydrofinishing with Vacuum Stripper
					Lube Hydrotreating with Multi-Fraction Distillation, Lube Hydrotreating Vacuum Stripper
					Wax Hydrofinishing with Vacuum Stripper, Wax Hydrotreating with Multi-Fraction Distillation, Wax Hydrotreating with Vacuum Stripper
CWB unit	Throughput Basis	Unit of Measure	CWB Factor	EIA Number	Process Subtypes
Asphalt Production	Total Asphalt Production	thousands of barrels/year	2.7	931	Asphalt Production

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Oxygenates	Product	thousands of barrels/year	4.9		Distillation Units
					Extraction Units
					ETBE
					TAME
Methanol Synthesis	Product	thousands of barrels/year	-36		Methanol Synthesis
Desalination	Product	millions of gallons/year	32.7		Desalination
	(Water)				
Special Fractionation	Feed	thousands of barrels/year	0.8		All Special Fractionation ex Solvents, Propylene, and Aromatics
Propane/Propylene Splitter (Propylene Production)	Feed	thousands of barrels/year	2.1		Chemical Grade
					Polymer grade
Fuel Gas Sales Treating & Compression (hp)	Horsepower	hp/year	919.8		Fuel Gas Sales Treating & Compression
Sulfuric Acid Regeneration	Product	thousands of short tons/year	37.8		Sulfuric Acid Regeneration
Ammonia Recovery Unit	Product	thousands of short tons/year	453		Ammonia Recovery Unit: PHOSAM
Cryogenic LPG Recovery	Feed	millions of standard cubic feet/year	0.25		Cryogenic LPG Recovery
Flare Gas Recovery	Feed	millions of standard cubic feet/year	0.13		Flare Gas Recovery
Flue Gas Desulfurizing	Feed	millions of standard cubic feet/year	0.02		Flue Gas Desulfurizing
CWB unit	Throughput Basis	Unit of Measure	CWB Factor	EIA Number	Process Subtypes
CO2 Liquefaction	CO2 product	short tons/year	-160	.	CO2 liquefaction
Total Input	Feed	thousands of barrels/year	0.327		
Non-Crude Input	Feed	thousands of barrels/year	0.44		
¹ Standard cubic feet are dry @ 60° F and 14.696 psia or 15 °C and 1 atmosphere.					

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Definitions

“Complexity weighted barrel” or “CWB” means a metric created to evaluate the greenhouse gas efficiency of petroleum refineries and related processes. The CWB value for an individual refinery is calculated using actual refinery throughput to specified process units and emission factors for these process units. The emission factor is denoted as the CWB factor and is representative of the greenhouse gas emission intensity at an average level of energy efficiency, for the same standard fuel type for each process unit for production, and for average process emissions of the process units across a sample of refineries. Each CWB factor is expressed as a value weighted relative to atmospheric crude distillation.

Process Definitions

- “Air separation unit” means a refinery unit which separates air into its components including oxygen. It is usually cryogenic but factor applies to all processes cryogenic or otherwise.
- “Alkylation/poly/dimersol” means a range of processes transforming C3/C4 molecules into C7/C8 molecules over an acidic catalyst. This can be accomplished by alkylation with sulfuric acid or hydrofluoric acid, polymerization with a C3 or C3/C4 olefin feed, or dimersol.
- “Ammonia recovery unit” means a refinery unit in which ammonia-rich sour water stripper overhead is treated to separate ammonia suitable for reuse in the refinery, in particular for the reduction of NOx emissions. This unit is the second stage of a two stage sour water stripping unit. The ammonia recovery unit includes, but is not limited to, the adsorber, stripper and fractionator.
- “Aromatic saturation of distillates” means the saturation of aromatic rings over a fixed catalyst bed at low or medium pressure and in the presence of hydrogen. This process includes the desulfurization step which should therefore not be accounted for separately.
- “AROMAX®” means a special application of catalytic reforming for the specific purpose of producing light aromatics.
- “Aromatics production” means extraction of light aromatics from reformat and/or hydrotreated pyrolysis gasoline by means of a solvent.
- “Asphalt production” means the processing required to produce asphalts and bitumen, including bitumen oxidation (mostly for road paving). Asphalt later modified with polymers is included.
- “Atmospheric Crude Distillation” means primary atmospheric distillation of crude oil and other feedstocks. The atmospheric crude distillation unit includes any ancillary equipment such as a crude desalter, naphtha splitting, gas plant and

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wet treatment of light streams for mercaptan removal. Some units may have more than one main distillation column.

- “Benzene saturation” means selective hydrogenation of benzene in gasoline streams over a fixed catalyst bed at moderate pressure.
- “C4 isomer production” means conversion of normal butane into isobutane over a fixed catalyst bed and in the presence of hydrogen at low to moderate pressure.
- “C5/C6 isomer production - including ISOSIV” means conversion of normal paraffins into isoparaffins over a fixed catalyst bed and in the presence of hydrogen at low to moderate pressure. Throughputs of this unit include the throughput of both once-through and recycle units.
- “Conventional naphtha hydrotreating” means desulfurization of virgin and cracked naphthas over a fixed catalyst bed at moderate pressure and in the presence of hydrogen. For cracked naphthas this also involves saturation of olefins.
- “Cryogenic LPG recovery” means a refinery unit in which liquefied petroleum gas (LPG) is extracted from refinery gas streams through cooling and removing the condensate heavy fractions. The processes and equipment for this unit include, but are not limited to, refrigeration, drier, compressor, absorber, stripper and fractionation.
- “Cumene production” means alkylation of benzene with propylene.
- “Cyclohexane production” means hydrogenation of benzene to cyclohexane over a catalyst at high pressure.
- “Delayed Coker” means a refinery unit which conducts a semi-continuous process, similar in line-up to a visbreaker, where the heat of reaction is supplied by a fired heater. Coke is produced in alternate drums that are swapped at regular intervals. Coke is cut out of full coke drums and disposed of as a product. For the purposes of analysis, facilities include coke handling and storage.
- “Desalination” means a refinery’s desalination of sea water or contaminated water. It includes all such processes.
- “Desulfurization of C4–C6 Feeds” means desulfurization of light naphthas over a fixed catalyst bed, at moderate pressure and in the presence of hydrogen.
- “Desulfurization of pyrolysis gasoline/naphtha” means selective or non-selective desulfurization of pyrolysis gasoline (by-product of light olefins production) and

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other streams over a fixed catalyst bed, at moderate pressure and in the presence of hydrogen.

- “Diolefin to olefin saturation of gasoline” means selective saturation of diolefins over a fixed catalyst bed, at moderate pressure and in the presence of hydrogen, to improve stability of thermally cracked and coker gasolines.
- “Distillate hydrotreating” means desulfurization of virgin kerosene over a fixed catalyst bed at low or medium pressure and in the presence of hydrogen.
- “Ethylbenzene production” means the process of combining benzene and ethylene to form ethylbenzene.
- “FCC gasoline hydrotreating with minimum octane loss” means selective desulfurization of FCC gasoline cuts with minimum olefins saturation, over a fixed catalyst bed, at moderate pressure and in the presence of hydrogen.
- “Flare gas recovery” means a refinery unit in which flare gas is captured and compressed for other uses. Usually recovered flare gas is treated and routed to the refinery fuel gas system. Depending upon the flare gas composition, recovered gas may have other uses. The equipment for this process includes, but is not limited to, the compressor and separator.
- “Flexicoker” means a refinery unit which conducts a proprietary process incorporating a fluid coker and where the surplus coke is gasified to produce a so-called “low BTU gas” which is used to supply the refinery heaters.
- “Flue gas desulfurizing” means a process in which sulfur dioxide is removed from flue gases with contaminants. This often involves an alkaline sorbent which captures sulfur dioxide and transforms it into a solid product. Various methods exist with varying sulfur dioxide removal efficiencies. Flue gas desulfurizing systems can be of the regenerative type or the non-regenerative type. The processes and equipment for this process include, but are not limited to, the contactor, catalyst/reagent regeneration, scrubbing circulation and solids handling.
- “Fluid Catalytic Cracking” means cracking of vacuum gasoil and residual feedstocks over a catalyst. The finely divided catalyst is circulated in a fluidized state from the reactor where it becomes coated with coke to the regenerator where coke is burned off. The hot regenerated catalyst returning to the reactor supplies the heat for the endothermic cracking reaction and for most of the downstream fractionation of cracked products.
- “Fluid Coker” means a proprietary continuous process where the fluidized powder-like coke is transferred between the cracking reactor and the coke burning vessel and burned for process heat production. Surplus coke is drawn off and disposed of as a product.

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- “Fuel gas sales treating & compression” means treatment and compression of refinery fuel gas for sale to a third party.
- “Hydrodealkylation” means dealkylation of toluene and xylenes into benzene over a fixed catalyst bed and in the presence of hydrogen at low to moderate pressure.
- “Kerosene hydrotreater” means a refinery process unit which treats and upgrades kerosene and gasoil streams using “aromatic saturation of distillates,” “distillate hydrotreating,” “middle distillate dewaxing” or the “S-Zorb™ process for kerosene and gasoil” or “selective hydrotreating of distillates.”
- “Lube catalytic dewaxing” means catalytic breakdown of long paraffinic chains in intermediate streams in the manufacture of lube oils.
- “Lube solvent dewaxing” means solvent removal of long paraffinic chains (wax) from intermediate streams in the manufacture of lube oils. Includes solvent regeneration. Different proprietary processes use different solvents, such as chlorocarbon, MEK/toluene, MEK/MIBK, or propane.
- “Lube solvent extraction” means solvent extraction of aromatic compounds from intermediate streams in the manufacture of base lube oils. This includes solvent regeneration. Different proprietary processes use different solvents, such as Furfural, NMP, phenol, or SO₂.
- “Lube/Wax hydrofining” means hydrotreating of lube oil fractions and wax for quality improvement.
- “Lubricant hydrocracking” means hydrocracking of heavy feedstocks for the manufacture of lube oils.
- “Methanol synthesis” means recombination of CO₂ and hydrogen for methanol synthesis. This factor is only applicable when a refinery produces hydrogen via partial oxidation.
- “Middle distillate dewaxing” means cracking of long paraffinic chains in gasoils to improve cold flow properties over a fixed catalyst bed at low or medium pressure and in the presence of hydrogen. This process includes the desulfurization step which should therefore not be accounted for separately.
- “Mild Residual FCC” means fluid catalytic cracking when the feed has a Conradson carbon level of 2.25% to 3.5% by weight.
- “Naphtha/Distillate Hydrocracker” means a refinery process unit which conducts cracking of vacuum gasoils and cracked heavy distillates over a fixed catalyst bed, at high pressure and in the presence of hydrogen. The process combines

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cracking and hydrogenation reactions. Conversion of naphtha into C3-C4 hydrocarbons is included here.

- “Naphtha hydrotreater” means a refinery process unit which treats and upgrades of naphtha/gasoline and lighter streams using “benzene saturation,” “desulfurization of C4–C6 feeds,” “conventional naphtha hydrotreating,” “diolefin to olefin saturation of gasoline,” “FCC gasoline hydrotreating with minimum octane loss,” “olefinic alkylation of thio sulfur,” and/or “desulfurization of pyrolysis gasoline/naphtha,” is a “reactor for selective hydrotreating” and may also use the “S-Zorb™ process for naphtha/distillates.”
- “Olefinic alkylation of thio sulfur” means a gasoline desulfurization process in which thiophenes and mercaptans are catalytically reacted with olefins to produce higher-boiling sulphur compounds removable by distillation. This does not involve hydrogen.
- “Other FCC” means early catalytic cracking processes on fixed catalyst beds, including Houdry catalytic cracking and Thermofor catalytic cracking.
- “Oxygenates” means ethers produced by reacting an alcohol with olefins.
- “Paraxylene production” means physical separation of paraxylene from mixed xylenes.
- “Propane/Propylene splitter (propylene production)” means a refinery unit that conducts separation of propylene from other mostly olefinic C3/C4 molecules generally produced in an FCC. Its product is propylene and must be chemical or polymer grade. “Chemical” and “polymer” are two grades with different purities.
- “POX syngas for fuel” means production of synthesis gas by gasification (partial oxidation) of heavy residues. This includes syngas clean-up.
- “Reactor for selective hydrotreating” means a special configuration where a distillation/fractionation column contains a solid catalyst that converts diolefins in FCC gasoline to olefins or where the catalyst bed is in a preheat train reactor vessel in front of the column.
- “Reformer - including AROMAX” means a refinery unit which increases the octane rating of naphtha by dehydrogenation of naphthenic rings and paraffin isomerisation over a noble metal catalyst at low pressure and high temperature. The process also produces hydrogen. Different configurations of the process are possible.
- “Residual FCC” means fluid catalytic cracking when the feed has a Conradson carbon level of greater than or equal to 3.5% by weight.

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- “Residual hydrotreater” means a refinery unit which conducts desulfurization of residues over a fixed catalyst bed at high pressure and in the presence of hydrogen. It results in a limited degree of conversion of the residue feed into lighter products.
- “Residual Hydrocracker” means a refinery unit which conducts hydrocracking of residual feedstocks. Different proprietary processes involve continuous or semi-continuous catalyst replenishment. The residual hydrocracker unit must be designed to process feed containing at least 50% mass of vacuum residue (defined as boiling over 550°C) for it to qualify as a residual hydrocracker for the purposes of complexity-weighted barrel throughputs.
- “S-Zorb™ process for kerosene and gasoil” means desulfurization of gasoil using a proprietary absorption process. This process does not involve hydrogen.
- “S-Zorb™ process for naphtha/distillates” means desulfurization of naphtha/gasoline streams using a proprietary fluid-bed hydrogenation adsorption process in the presence of hydrogen.
- “Selective hydrotreating of distillates” means selective saturation of diolefins in C4 streams for alkylation over a fixed catalyst bed, at moderate pressure and in the presence of hydrogen, or hydrotreatment of distillates for conversion of diolefins to olefins.
- “Solvent deasphalter” means a refinery unit which conducts separation of the lighter fraction of a vacuum or cracked residue by means of a solvent such as propane, butane or heavier.
- “Special Fractionation” means fractionation processes excluding solvents, propylene and aromatics fractionation, which are accomplished by a deethanizer, depropanizer, deisobutanizer, debutanizer, deisopentanizer, depentanizer, deisohexanizer, dehexanizer, deisoheptanizer, deheptanizer, naphtha splitter, alkylate splitter or reformat splitter.
- “Standard FCC” means fluid catalytic cracking when the feed has a Conradson carbon level of less than 2.25% by weight.
- “Sulfur (recovered)” means sulfur produced by partial oxidation of hydrogen sulfide into elemental sulfur.
- “Sulfuric acid regeneration” means a catalytic process in which spent acid is regenerated to concentrated sulfuric acid. The equipment for this process includes, but is not limited to, the combustor, waste heat boiler, converter, absorber, SO₃ recycle, gas cleaning including electrostatic precipitator and amine regenerator.

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- “Thermal Cracking” means thermal cracking of distillate feedstocks. A thermal cracking unit may include a vacuum flasher. Units that combine visbreaking and thermal cracking of distillate generate a contribution for both processes based on the residue and the distillate throughput respectively.
- “Toluene disproportionation/transalkylation means a fixed-bed catalytic process for the conversion of toluene to benzene and xylene in the presence of hydrogen.
- “Vacuum Distillation” means distillation of atmospheric residues under vacuum. The process line up must include a heater. Some units may have more than one main distillation column.
- “Visbreaker” means a refinery unit which conducts mild thermal cracking of residual feedstocks to produce some distillates and reduce the viscosity of the cracked residue. It may include a vacuum flasher. Units that combine visbreaking and thermal cracking of distillate generate a contribution for both processes based on the residue and the distillate throughput respectively.
- “VGO Hydrotreater” means a refinery unit which conducts desulfurization of vacuum gasoils usually destined to be used as FCC feed, over a fixed catalyst bed at medium or high pressure and in the presence of hydrogen.
- “Wax deoiling” means solvent removal of lighter hydrocarbons from wax obtained from lube dewaxing. Different proprietary processes use different solvents, such as MEK/toluene, MEK/MIBK, or propane.
- “Xylene isomerization” means isomerization of mixed xylenes to paraxylene.