## ANNEX II

## Specific product benchmarks

1. Refineries benchmark: $\mathrm{CO}_{2}$ weighted tonne (CWT) functions

| CWT function | Description | Basis (kt/a) ${ }^{\mathbf{a}}$ | CWT factor |
| :--- | :--- | :--- | :--- |
| Atmospheric Crude <br> Distillation | Mild Crude Unit, <br> Standard Crude Unit | F | 1,00 |
| Vacuum Distillation | Mild Vacuum <br> Fractionation, <br> Standard Vacuum <br> Column, Vacuum <br> Fractionating Column <br> Vacuum distillation <br> factor also includes <br> average energy <br> and emissions for <br> Heavy Feed Vacuum <br> (HFV) unit. Since <br> this is always in <br> series with the Mild <br> Vacuum Unit (MVU), <br> HFV capacity is not <br> counted separately. | F | 0,85 |
| Visbreaking | Atmospheric <br> Residuum (w/o <br> a Soaker Drum), <br> Atmospheric <br> Residuum (with <br> a Soaker Drum), <br> Vacuum Bottoms <br> Feed (w/o a Soaker <br> Drum), Vacuum <br> Bottoms Feed (with a <br> Soaker Drum) <br> Visbreaking factor <br> also includes average <br> energy and emissions <br> for Vacuum Flasher <br> Column (VAC VFL) <br> but capacity is not <br> counted separately. | F | F |
| Solvent, Supercritical |  |  |  |
| Solvent |  |  |  |$\quad$| F |
| :--- |

[^0]|  | and emissions for <br> Vacuum Flasher <br> Column (VAC VFL) <br> but capacity is not <br> counted separately. |  |  |
| :--- | :--- | :--- | :--- |
| Delayed Coking | Delayed Coking | F | 2,20 |
| Fluid Coking | Fluid Coking | F | 7,60 |
| Flexicoking | Flexicoking | F | 16,60 |
| Coke Calcining | Vertical-Axis Hearth, <br> Horizontal-Axis <br> Rotary Kiln | P | 12,75 |
| Fluid Catalytic <br> Cracking | Fluid Catalytic <br> Cracking, Mild <br> Residuum Catalytic <br> Cracking, Residual <br> Catalytic Cracking | F | F |


|  | Naphtha hydrotreating factor includes energy and emissions for Reactor for Selective H/ T (NHYT/RXST) but capacity is not counted separately. |  |  |
| :---: | :---: | :---: | :---: |
| Kerosene/Diesel Hydrotreating | Aromatic Saturation, Conventional H/T, Solvent aromatics hydrogenation, Conventional Distillate H/T, High Severity Distillate H/T, Ultra-High Severity H/T, <br> Middle Distillate Dewaxing, S-Zorb ${ }^{\text {TM }}$ Process, Selective Hydrotreating of Distillates | F | 0,90 |
| Residual Hydrotreating | Desulfurisation of Atmospheric Residuum Desulfurisation of Vacuum Residuum | F | 1,55 |
| VGO Hydrotreating | Hydrodesulphurisation denitrification, Hydrodesulphurisation |  | 0,90 |
| Hydrogen Production | Steam Methane Reforming, Steam Naphtha Reforming, Partial Oxidation Units of Light Feeds Factor for hydrogen production includes energy and emissions for purification (H2PURE), but capacity is not counted separately. | P (referred to 100 \% hydrogen) | 300,00 |
| Catalytic Reforming | Continuous Regeneration, Cyclic, Semi-Regenerative, AROMAX | F | 4,95 |
| Alkylation | Alkylation with HF Acid, Alkylation | P | 7,25 |

a Net fresh feed (F), Reactor feed (R, includes recycle), Product feed (P), Synthesis gas production for POX units (SG)

|  | with Sulfuric Acid, <br> Polymerisation <br> C3 Olefin Feed, <br> Polymerisation C3/ <br> C4 Feed, Dimersol <br> Factor for alkylation/ <br> polymerisation <br> includes energy and <br> emissions for acid <br> regeneration (ACID), <br> but capacity is not <br> counted separately. |  |
| :--- | :--- | :--- |
|  | C4 Isomerisation <br> Factor also includes <br> energy and emissions <br> related to average <br> EU27 special | R |
| fractionation (DIB) |  |  |
| correlated with C4 |  |  |
| isomerisation. |  |  |$\quad$| C4 Isomerisation |
| :--- | :--- | :--- |$\quad$| R |
| :--- |

a Net fresh feed (F), Reactor feed (R, includes recycle), Product feed (P), Synthesis gas production for POX units (SG)

|  | for tail gas recovery <br> (TRU) and H2S <br> Springer Unit (U32), <br> but capacity is not <br> counted separately. |  |
| :--- | :--- | :--- |
| Aromatic Solvent <br> Extraction | ASE: Extraction <br> Distillation, ASE: <br> Liquid/Liquid <br> Extraction, ASE: <br> Liq/Liq w/Extr. <br> Distillation <br> CWT factor cover all <br> feeds including Pygas <br> after hydrotreatment. <br> Pygas hydrotreating <br> should be accounted <br> under naphtha <br> hydrotreatment. | F |

[^1]Changes to legislation: There are outstanding changes not yet made to Commission Delegated Regulation (EU) 2019/331. Any changes that have already been made to the legislation appear in the content and are referenced with annotations. (See end of Document for details) View outstanding changes
$\left.\begin{array}{l|l|l|l}\hline \text { Cumene production } & \text { Cumene production } & \text { P } & 5,00 \\ \hline \text { Phenol production } & \text { Phenol production } & \text { P } & 1,15 \\ \hline \begin{array}{l}\text { Lube solvent } \\ \text { extraction }\end{array} & \begin{array}{l}\text { Lube solvent } \\ \text { extraction: Solvent } \\ \text { is Furfural, Solvent }\end{array} & \text { F } & 2,10 \\ \text { is NMP, Solvent is } \\ \text { Phenol, Solvent is } \\ \text { SO } 2\end{array}\right)$
a Net fresh feed (F), Reactor feed (R, includes recycle), Product feed (P), Synthesis gas production for POX units (SG)

Changes to legislation: There are outstanding changes not yet made to Commission Delegated Regulation
(EU) 2019/331. Any changes that have already been made to the legislation appear in the content and are referenced with annotations. (See end of Document for details) View outstanding changes

| Mol sieve for C10+ <br> paraffins | Mol sieve for C10+ <br> paraffins | P | 1,85 |
| :--- | :--- | :--- | :--- |
| Partial Oxidation <br> of Residual Feeds <br> (POX) for Fuel | POX Syngas for Fuel | SG (referred to 47 \% <br> hydrogen) | 8,20 |
| Partial Oxidation <br> of Residual Feeds <br> (POX) for Hydrogen <br> or Methanol | POX Syngas <br> for Hydrogen or <br> Methanol, POX <br> Syngas for Methanol <br> Factor includes <br> energy and emissions <br> for CO Shift and H2 <br> Purification (U71) <br> but capacity is not <br> counted separately. | SG (referred to 47 \% <br> hydrogen) | 44,00 |
| Methanol from <br> syngas | Methanol | P | Pres |

a Net fresh feed (F), Reactor feed (R, includes recycle), Product feed (P), Synthesis gas production for POX units (SG)
2. Aromatics benchmark: CWT functions

| CWT function | Description | Basis (kt/a) $^{\mathbf{a}}$ | CWT factor |
| :--- | :--- | :--- | :--- |
| Naphtha/gasoline <br> hydrotreater | Benzene Saturation, <br> Desulfurisation <br> of C4-C6 Feeds, <br> Conventional <br> Naphtha H/T, <br> Diolefin to Olefin <br> Saturation, Diolefin <br> to Olefin Saturation <br> of Alkylation Feed, <br> FCC Gasoline <br> hydrotreating with <br> minimum octane loss, | 1,10 |  |
| Olefinic Alkylation |  |  |  |
| of Thio S, S-Zorb ${ }^{\text {TM }}$ |  |  |  |$\quad$| a |
| :--- |


|  | Process, Selective H/ <br> T of Pygas/Naphtha, <br> Pygas/Naphtha <br> Desulfurisation, <br> Selective H/T of <br> Pygas/Naphtha. <br> Naphtha <br> hydrotreating factor <br> includes energy and <br> emissions for Reactor <br> for Selective H/ <br> T (NHYT/RXST) <br> but capacity is not <br> counted separately. |  |
| :--- | :--- | :--- |

## Changes to legislation:

There are outstanding changes not yet made to Commission Delegated Regulation (EU)
$2019 / 331$. Any changes that have already been made to the legislation appear in the content and are referenced with annotations.
View outstanding changes

## Changes and effects yet to be applied to :

- Regulation applied (with modifications) by S.I. 2023/850 art. 20(1)
- Regulation revoked by S.I. 2019/916 reg. 62
- $\quad$ Regulation word substituted by S.I. 2020/1557 Sch. 1 para. 2


## Changes and effects yet to be applied to the whole legislation item and associated provisions

- $\quad$ Signature words omitted by S.I. 2020/1557 Sch. 1 para. 32
- Annex 7 s. 4.2 sum substituted by S.I. 2020/1557 Sch. 1 para. 37(5)(a)(i)
- Annex 7 s. 4.2 sum substituted by S.I. 2020/1557 Sch. 1 para. 37(5)(a)(ii)(aa)
- Annex 7 s. 4.2 sum substituted by S.I. 2020/1557 Sch. 1 para. 37(5)(a)(ii)(cc)
- Annex 7 s. 7.3 word substituted by S.I. 2020/1557 Sch. 1 para. 37(7)(b)(ii)
- Annex 7 s. 7.3 word substituted by S.I. 2020/1557 Sch. 1 para. 37(7)(c)(ii)
- Annex 7 s. 1 words inserted by S.I. 2020/1557 Sch. 1 para. 37(2)(a)
- Annex 7 s. 4.4 words inserted by S.I. 2020/1557 Sch. 1 para. 37(5)(b)(i)
- Annex 7 s. 4.6 words inserted by S.I. 2020/1557 Sch. 1 para. 37(5)(d)(i)
- Annex 7 s. 7.3 words inserted by S.I. 2020/1557 Sch. 1 para. 37(7)(a)
- Annex 7 s. 7.3 words inserted by S.I. 2020/1557 Sch. 1 para. 37(7)(b)(i)
- Annex 7 s. 7.3 words inserted by S.I. 2020/1557 Sch. 1 para. 37(7)(c)(i)
- Annex 7 s. 10.1.2 words inserted by S.I. 2020/1557 Sch. 1 para. 37(8)(b)
- Annex 7 s. 1 words substituted by S.I. 2020/1557 Sch. 1 para. 37(2)(b)
- Annex 7 s. 2 words substituted by S.I. 2020/1557 Sch. 1 para. 37(3)(a)
- Annex 7 s. 2 words substituted by S.I. 2020/1557 Sch. 1 para. 37(3)(b)
- Annex 7 s. 3.1 words substituted by S.I. 2020/1557 Sch. 1 para. 37(4)
- Annex 7 s. 4.2 words substituted by S.I. 2020/1557 Sch. 1 para. 37(5)(a)(ii)(bb)
- $\quad$ Annex 7 s. 4.4 words substituted by S.I. 2020/1557 Sch. 1 para. 37(5)(b)(ii)
- Annex 7 s. 4.5 words substituted by S.I. 2020/1557 Sch. 1 para. 37(5)(c)
- Annex 7 s. 4.6 words substituted by S.I. 2020/1557 Sch. 1 para. 37(5)(d)(ii)
- Annex 7 s. 4.6 words substituted by S.I. 2020/1557 Sch. 1 para. 37(5)(d)(iii)
- $\quad$ Annex 7 s. 6.1 words substituted by S.I. 2020/1557 Sch. 1 para. 37(6)
- Annex 7 s. 10.1.1 words substituted by S.I. 2020/1557 Sch. 1 para. 37(8)(a)
- Annex 7 s. 4.2(f) words substituted by S.I. 2023/850 art. 14(2)
- Annex 4 s. 1.1 word omitted by S.I. 2020/1557 Sch. 1 para. 34(3)(a)(iii)
- Annex 4 s. 1.1 word substituted by S.I. 2020/1557 Sch. 1 para. 34(3)(a)(i)
- Annex 4 s. 2.6 word substituted by S.I. 2020/1557 Sch. 1 para. 34(4)(c)(i)
- Annex 4 s. 1.6 heading words inserted by S.I. 2020/1557 Sch. 1 para. 34(3)(d)(i)
- $\quad$ Annex 4 s. 1.6 words inserted by S.I. 2020/1557 Sch. 1 para. 34(3)(d)(ii)(aa)
- Annex 4 s. 2.3 words inserted by S.I. 2020/1557 Sch. 1 para. 34(4)(b)(i)
- Annex 4 s. 2.3 words inserted by S.I. 2020/1557 Sch. 1 para. 34(4)(b)(ii)
- Annex 4 s. 2.3 words inserted by S.I. 2020/1557 Sch. 1 para. 34(4)(b)(iii)
- Annex 4 s. 2.3 words inserted by S.I. 2020/1557 Sch. 1 para. 34(4)(b)(iv)
- Annex 4 s. 2.3 words inserted by S.I. 2020/1557 Sch. 1 para. 34(4)(b)(v)
- Annex 4 s. 2.3 words inserted by S.I. 2020/1557 Sch. 1 para. 34(4)(b)(vi)
- Annex 4 s. 2.3 words inserted by S.I. 2020/1557 Sch. 1 para. 34(4)(b)(vii)(bb)
- Annex 4 s. 2.6 words inserted by S.I. 2020/1557 Sch. 1 para. 34(4)(c)(iii)(bb)
- Annex 4 s. 1.1 words omitted by S.I. 2020/1557 Sch. 1 para. 34(3)(a)(ii)
- $\quad$ Annex 4 s. 1.4 words omitted by S.I. 2020/1557 Sch. 1 para. 34(3)(c)(i)
- Annex 4 s. 2.3 words omitted by S.I. 2020/1557 Sch. 1 para. 34(4)(b)(vii)(aa)
- Annex 4 s. 1.3 words substituted by S.I. 2020/1557 Sch. 1 para. 34(3)(b)(i)
- Annex 4 s. 1.3 words substituted by S.I. 2020/1557 Sch. 1 para. 34(3)(b)(ii)
- Annex 4 s. 1.4 words substituted by S.I. 2020/1557 Sch. 1 para. 34(3)(c)(ii)
- Annex 4 s. 1.6 words substituted by S.I. 2020/1557 Sch. 1 para. 34(3)(d)(ii)(bb)
- Annex 4 s. 2.1 words substituted by S.I. 2020/1557 Sch. 1 para. 34(4)(a)(i)(aa)
- Annex 4 s. 2.1 words substituted by S.I. 2020/1557 Sch. 1 para. 34(4)(a)(i)(bb)
- Annex 4 s. 2.1 words substituted by S.I. 2020/1557 Sch. 1 para. 34(4)(a)(ii)
- Annex 4 s. 2.6 words substituted by S.I. 2020/1557 Sch. 1 para. 34(4)(c)(ii)
- Annex 4 s. 2.6 words substituted by S.I. 2020/1557 Sch. 1 para. 34(4)(c)(iii)(aa)
- Annex 4 s. 2.7 words substituted by S.I. 2020/1557 Sch. 1 para. 34(4)(d)
- Annex 6 para. 1(c) omitted by S.I. 2022/1173 art. 24(2)(a)
- Annex 6 s. 1 word substituted by S.I. 2020/1557 Sch. 1 para. 36(2)(a)
- Annex 6 s. 1 words inserted by S.I. 2020/1557 Sch. 1 para. 36(2)(b)(i)
- Annex 6 s. 1 words inserted by S.I. 2020/1557 Sch. 1 para. 36(2)(b)(ii)
- Annex 6 s. 4 words substituted by S.I. 2020/1557 Sch. 1 para. 36(3)
- Annex 6 para. 1(d) words substituted by S.I. 2022/1173 art. 24(2)(b)
- Art. 2(1) Art. 2 renumbered as Art. 2(1) by S.I. 2020/1557 Sch. 1 para. 4(2)
- Art. 2.1(1) substituted by S.I. 2020/1557 Sch. 1 para. 4(3)(a)
- Art. 2(2)(3) inserted by S.I. 2020/1557 Sch. 1 para. 4(4)
- Art. 2.1(3) words inserted by S.I. 2020/1557 Sch. 1 para. 4(3)(b)
- Art. 2.1(4) words inserted by S.I. 2020/1557 Sch. 1 para. 4(3)(c)
- Art. 2.1(5) words inserted by S.I. 2020/1557 Sch. 1 para. 4(3)(d)
- Art. 2.1(10) words substituted by S.I. 2020/1557 Sch. 1 para. 4(3)(e)
- Art. 2.1(11) words substituted by S.I. 2020/1557 Sch. 1 para. 4(3)(f)
- Art. 2.1(14) substituted by S.I. 2020/1557 Sch. 1 para. 4(3)(g)
- Art. 2.1(15) omitted by S.I. 2020/1557 Sch. 1 para. 4(3)(h)
- Art. 2.1(19)-(23) inserted by S.I. 2020/1557 Sch. 1 para. 4(3)(i)
- Art. 2a inserted by S.I. 2020/1557 Sch. 1 para. 5
- Art. 3a inserted by S.I. 2020/1557 Sch. 1 para. 7
- Art. 4(1)(1A) substituted for Art. 4(1) by S.I. 2020/1557 Sch. 1 para. 8(3)
- Art. 4(2)(a) words omitted by S.I. 2020/1557 Sch. 1 para. 8(4)(a)(ii)
- Art. 4(2)(a) words substituted by S.I. 2020/1557 Sch. 1 para. 8(4)(a)(i)
- Art. 4(2)(b) words inserted by S.I. 2020/1557 Sch. 1 para. 8(4)(b)(i)
- Art. 4(2)(b) words inserted by S.I. 2020/1557 Sch. 1 para. 8(4)(b)(ii)
- Art. 4(2)(c) substituted by S.I. 2020/1557 Sch. 1 para. 8(4)(c)
- Art. 4(3)(4) inserted by S.I. 2020/1557 Sch. 1 para. 8(5)
- Art. 5(3a) inserted by S.I. 2022/1173 art. 20(2)
- Annex 8 inserted by S.I. 2023/850 art. 15
- Art. 8(6)(7) inserted by S.I. 2020/1557 Sch. 1 para. 12(5)
- Art. 8(7)(c) inserted by S.I. 2021/1455 art. 30(2)
- Art. 10(5)(b) words inserted by S.I. 2020/1557 Sch. 1 para. 14(5)(a)(i)
- Art. 10(5)(b) words inserted by S.I. 2020/1557 Sch. 1 para. 14(5)(a)(ii)
- Art. 10(5)(d) word substituted by S.I. 2020/1557 Sch. 1 para. 14(5)(b)(ii)
- Art. 10(5)(d) words inserted by S.I. 2020/1557 Sch. 1 para. 14(5)(b)(i)
- Art. 15a inserted by S.I. 2020/1557 Sch. 1 para. 18
- Art. 16(2)(a)-(d) words substituted by S.I. 2023/850 art. 12(2)
- Art. 16(2)(d) word substituted by S.I. 2020/1557 Sch. 1 para. 19(4)(a)(ii)
- Art. 16(10)-(12) inserted by S.I. 2020/1557 Sch. 1 para. 19(11)
- Art. 16(10) words substituted by S.I. 2023/850 art. 12(4)
- Art. 16(12) words substituted by S.I. 2023/850 art. 12(5)(a)
- Art. 16(12)(a) words substituted by S.I. 2023/850 art. 12(5)(b)
- Art. 16(12)(b) words substituted by S.I. 2023/850 art. 12(5)(c)
- Art. 16a16b inserted by S.I. 2020/1557 Sch. 1 para. 20
- Art. 17(1) Art. 17 renumbered as Art. 17(1) by S.I. 2020/1557 Sch. 1 para. 21(2)
- Art. 17(1) words substituted by S.I. 2020/1557 Sch. 1 para. 21(3)(a)
- Art. 17(1)(a) words omitted by S.I. 2020/1557 Sch. 1 para. 21(3)(b)
- Art. 17(1)(b) words inserted by S.I. 2020/1557 Sch. 1 para. 21(3)(c)
- Art. 17(1)(c) words inserted by S.I. 2020/1557 Sch. 1 para. 21(3)(d)
- Art. 17(2) inserted by S.I. 2020/1557 Sch. 1 para. 21(4)

Art. 18(A1)(A2) inserted by S.I. 2020/1557 Sch. 1 para. 22(3)
Art. 18(1)(a) words inserted by S.I. 2020/1557 Sch. 1 para. 22(4)(a)(ii)
Art. 18(1)(a) words substituted by S.I. 2023/850 art. 13(2)
Art. 18(1)(b) words substituted by S.I. 2020/1557 Sch. 1 para. 22(4)(b)
Art. 18(2A) inserted by S.I. 2020/1557 Sch. 1 para. 22(6)
Art. 18(7) inserted by S.I. 2020/1557 Sch. 1 para. 22(9)

- Art. 18a inserted by S.I. 2020/1557 Sch. 1 para. 23
- Art. 25(3)(b) words substituted by S.I. 2022/1173 art. 22(2)
- Art. 25(6)(b) words substituted by S.I. 2022/1173 art. 22(3)
- Art. 25(8)(a) words substituted by S.I. 2022/1173 art. 22(4)
- Art. 25(9)(b) words substituted by S.I. 2022/1173 art. 22(5)
- Art. 25(10)(c)(d) inserted by S.I. 2022/1173 art. 22(6)


[^0]:    a Net fresh feed (F), Reactor feed (R, includes recycle), Product feed (P), Synthesis gas production for POX units (SG)

[^1]:    a Net fresh feed (F), Reactor feed (R, includes recycle), Product feed (P), Synthesis gas production for POX units (SG)

