EGGA
GALVANIZING EUROPE

Implementation of the EU BAT Conclusions for Ferrous Metal Processing

A Guide for Operators of Batch Galvanizing Installations

This Guide refers to COMMISSION IMPLEMENTING DECISION (EU) 2022/2110 of 11 October 2022 establishing the best available techniques (BAT) conclusions, under Directive 2010/75/EU of the European Parliament and of the Council on industrial emissions, for the ferrous metals processing industry

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EUROPEAN GENERAL GALVANIZERS ASSOCIATION

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1. BACKGROUND

1.1 LEGISLATIVE OVERVIEW

The EU Industrial Emissions Directive 2010/75/EU (IED) regulates emissions from industrial installations. Approximately 50,000 installations in the EU fall in the scope of the activities described under Annex I of the IED and, as such, must operate according to the requirements of the directive, including the obligation to hold a permit under the Directive (IED Article 4(1)).

The main purpose of the IED is to "achieve a high level of protection of the environment as a whole" (IED Article 1). The term 'as a whole' refers to the integrated approach to pollution prevention and control which requires that the whole environmental performance of the installation is considered in the permit.

To implement these objectives, Best Available Techniques (BAT) Reference documents (BREFs), defined under the IED as "describing, in particular, applied techniques, present emissions and consumption levels, techniques considered for the determination of best available techniques as well as BAT conclusions and any emerging techniques […]", are developed for each industrial sector. A specific chapter of the BREF documents lays down the BAT conclusions, which are published as Commission Implementing Decisions, and become the reference for setting permit conditions by national competent authorities (IED Art. 14(3)).

The BAT conclusions contain a number of conclusions on BAT (hereafter termed a "BATC"). In the specific case of the Ferrous Metal Processing (FMP) BREF, 63 BATCs were identified, covering the following FMP subsectors: hot rolling, cold rolling, wire drawing, hot dip coating and batch galvanizing. Each BAT-c consists of different elements:

− Techniques listed in BAT-c, including their description and information to assess their applicability, are neither prescriptive nor exhaustive. Not all techniques are relevant or applicable to all FMP sub-sectors. Other techniques may be used that ensure at least an equivalent level of environmental protection (see BREF guidance (2012/119/EU), section 3.1).

− Emission levels associated with the best available techniques (BAT-AELs) are binding according to IED Article. 15(3): "*The competent authority shall set emission limit values that ensure that, under normal operating conditions, emissions do not exceed the emission levels associated with the best available techniques as laid down in the decisions on BAT conclusions referred to in Article 13(5) […*]";

− BAT Associated Environmental Performance Levels other than emission levels (BAT-AEPLs) are only described in the Commission's BREF guidance (section 3.3.2.), which is not a legally-binding document.

IED Article. 21(3) provides the framework for reconsideration and updating of permit conditions when decisions on BAT conclusions are published:

> "*Within 4 years of publication of decisions on BAT conclusions in accordance with Article 13(5) relating to the main activity of an installation, the competent authority shall ensure that:*
>
> *a) all the permit conditions for the installation concerned are reconsidered and, if necessary, updated to ensure compliance with this Directive, in particular, with Article 15(3) and (4), where applicable;*
>
> *b) the installation complies with those permit conditions.*

> *The reconsideration shall take into account all the new or updated BAT conclusions applicable to the installation and adopted in accordance with Article 13(5) since the permit was granted or last reconsidered*."

The reconsideration of existing permits for installations where an activity covered by the FMP BREF is the main activity must take place between 4 November 2022 and 4 November 2026.

New installations which permits are issued after the publication of BAT conclusions must comply with the permit conditions immediately.

1.2 POSITION OF BATCH GALVANIZING IN THE SCOPE OF THE FMP BAT CONCLUSIONS

Batch galvanizing installations were intended to be regulated under the 1996 IPPC Directive and the subsequent Industrial Emissions Directive according to the entry 2.3 (c) in Annex I to those directives:

> *2.3. Processing of ferrous metals:*
>
> *(a) operation of hot-rolling mills with a capacity exceeding 20 tonnes of crude steel per hour;*
>
> *(b) operation of smitheries with hammers the energy of which exceeds 50 kilojoule per hammer, where the calorific power used exceeds 20 MW;*
>
> ***(c) application of protective fused metal coats with an input exceeding 2 tonnes of crude steel per hour.***

During the development of the 1996 IPPC Directive and the first FMP BREF published in 2001, it was deemed that batch galvanizing installations would be considered under 2.3 (c) and the relevant activity threshold of "2 tonnes per hour" would be applied.

To avoid confusion with other entries in Annex I, the situation was further clarified in the Scope of the 2006 BREF for 'Surface Treatment of Metals and Plastics' where it was clearly stated that the STM BREF did not deal with: "*hot-dip galvanising and the bulk pickling of iron and steels are discussed in the reference document on Best Available Techniques in the ferrous metals processing industry*".

Despite the clarity of the situation at EU level, over previous years, some national and regional authorities have mistakenly issued IPPC or IED permits to batch galvanizing installations under entry 2.6 of Annex I of the IED:

> *2.6. Surface treatment of metals or plastic materials using an electrolytic or chemical process where the volume of the treatment vats exceeds 30 m^3*

During development of the current FMP BREF and BAT Conclusions, problematic confusion at national level regarding the erroneous application of entry 2.6 for batch galvanizing installations, combined with issues related to bulk pickling of cold rolled steel, led to the extension of the scope of the FMP BAT Conclusions that were published in 2022, as follows:

> *2.3. Processing of ferrous metals:*
> *(a) operation of hot rolling mills with a capacity exceeding 20 tonnes of crude steel per hour;*
>
> *(c)application of protective fused metal coats with an input exceeding 2 tonnes of crude steel per hour; this includes hot dip coating and* ***batch galvanising****.*

*2.6. Surface treatment of ferrous metals using electrolytic or chemical processes where the volume of the treatment vats exceeds 30 m[33], when it is carried out in cold rolling, wire drawing or **batch galvanising**.*

It must be noted that many Member States and EGGA strongly opposed the application of the activity threshold of 30 $m^3$of treatment vat capacity to the batch galvanizing sector within the framework of the FMP BAT Conclusions. It was clear to EGGA the threshold of 30 $m^3$of treatment vat capacity was mainly established as a measure of the potential for emissions from the electroplating sector which is an entirely different environmental profile and process configuration.

However, EGGA supported the regulatory clarity that:

(i) only the FMP BAT Conclusions are to be applied for batch galvanizing installations and
(ii) The BAT Conclusions for Surface Treatment of Metals and Plastics (STM) are not to be applied for permitting of batch galvanizing installations.

KEY POINT: Smaller batch galvanizing installations that were previously falling outside the scope of the IED under the activity threshold of '2 tonnes per hour' but may exceed the '2.6 threshold' of 30 $m^3$of treatment vat capacity, should especially note the above historical perspective during permit discussions with national competent authorities.

1.3 DEVELOPMENT AND STRUCTURE OF THE FMP BAT CONCLUSIONS

In the context of the FMP BREF, the ferrous metal processing sector comprises the following sub-sectors:

- Hot rolling
- Cold Rolling
- Wire Drawing
- Continuous hot dip coating (sheet and wire)
- Batch galvanizing (including tubes)

During development of the FMP BAT Conclusions, it was difficult to establish clarity for a term to describe continuous hot dip coating of steel strip and sheet and to distinguish this from batch galvanizing (a significantly different process). The Technical Working Group (TWG) established the term 'hot dip coating' to describe continuous hot dip coating of steel strip and sheet.

It is important to note the definitions of 'hot dip coating' and 'batch galvanizing' when interpreting and applying the FMP BAT Conclusions:

Batch galvanizing: "*Discontinuous immersion of steel workpieces in a bath containing molten zinc to coat their surface with zinc. This also includes any directly associated pre- and post-treatment processes (e.g. degreasing and passivation)*."

Hot dip coating: "*Continuous immersion of steel sheets or wires through a bath containing molten metal(s), e.g. zinc and/or aluminium, to coat the surface with metal(s). This also includes any directly associated pre- and post-treatment processes (e.g. pickling and phosphating)*."

KEY POINT: The term 'hot dip coating' appears in many BATc's but does not refer to batch galvanizing.

1.4 TERMINOLOGY

Acronym	Full Term	Notes
BAT-AEL	**B**est **A**vailable **T**echnique – **A**ssociated **E**mission **Limit** Example: Dust emissions to Air (mg/Nm^3)	**Mandatory** for National Government to set the emission limit in the plant's permit within this range of limit values
BAT-AEPL	**B**est **A**vailable **T**echnique – **A**ssociated **E**nvironmental **P**erformance **Level** Example: Energy use (kWh/tonne)	**Optional** for National Government to set performance level in the plant's permit using this range of performance values

KEY POINT: BAT-AELs and BAT-AEPLs are always given as a range of values to represent possible values for different techniques used in well-performing plants.

2. IDENTIFYING RELEVANT BAT CONCLUSIONS FOR A BATCH GALVANIZING INSTALLATION

2.1 'GENERAL' AND 'SPECIFIC' FMP BAT CONCLUSIONS

The FMP BAT Conclusions were developed and published as:

- General BAT Conclusions that may be applicable to all sub-sectors (Section 1.1)
- Specific BAT Conclusions that are only applicable to specific sub-sectors (Sections 1.2 to 1.6)

Specific BAT Conclusions for batch galvanizing installations are given in Section 1.6 (*BAT conclusions for batch galvanising*) and covers:

BAT 58	Spent acid/separate stripping
BAT 59	Spent stripping solutions
BAT 60	Material efficiency during dipping
BAT 61	Material efficiency (tube galvanizing)
BAT 62*	HCl emissions to air from pickling
BAT 63	Waste water

* Denotes a BAT that includes a quantitative BAT-AEL, BAT-AEPL or indicative limit that is specifically relevant to a batch galvanizing installation

It is important to note that many, but not all, general BAT Conclusions given in Section 1.1 (BAT 1 to BAT 37) are applicable to batch galvanizing installations. Depending on the details of the batch galvanizing installation, it is probable that 21 of the 37 general BAT Conclusions are directly, or indirectly, relevant to batch galvanizing.

2.2 INTERPRETATION OF THE GENERAL BAT CONCLUSIONS

The integration of requirements that may be applicable to more than one sub-sector into a single BAT chapter makes interpretation of the 'General BAT Conclusions' in section 1.1, very difficult. Note that a BAT or technique that is applicable for only two sub-sectors (but not relevant for other sub-sectors) have been included in 'General BAT Conclusions'. This creates high potential for misunderstandings by permitting authorities and installation operators.

Important information to ensure correct interpretation of the relevance of the 'General BAT Conclusions' to a batch galvanizing installation can be found in:

- The 'Applicability' column of each BAT
- Table 11.1 of the main BREF document
- Careful attention to the wording of the BAT statement within each BATC

Table 11.1 of the main BREF document is especially useful but is not directly included in the BAT Conclusions. This table lists all techniques linked to the BATCs and identifies, for each sub-sector, if the

technique is used (U in the table) or not used (N in the table). This table must be read in conjunction with the Applicability column for each BATC if there is uncertainty as to the relevance of specific techniques for a batch galvanizing installation.

Below is an example extract from Table 11.1 of the main BREF document. Note that the 7th column of the table indicated the relevance of specific techniques to the objectives of the BATC number that is given in the 8th column.

For example, the entry for BREF technique for 8.2.2 (Monitoring of emissions to water) indicated 'N' for batch galvanizing regarding BAT 8 because there are normally no emissions of process water from a batch galvanizing installation.

Table 11.1: Information on the reported use of BAT in the various FMP sectors

BREF section number	Title of technique	Hot rolling	Cold rolling	Wire drawing	Continuous hot dip coating	Batch galvanising	Relevant BAT number in Chapter 9
5.4.1.5.3	Closed tanks combined with air extraction in the case of continuous post-treatment	N	N	N	U	N	28b
5.4.1.5.4	Minimisation of drag-out of chemical solution	N	N	N	U	N	17c
5.4.1.5.5	Use of roll coaters for strips	N	N	N	U	N	17b
5.4.3.2.3	Air or nitrogen wiping	N	N	N	U	N	57a
5.4.3.2.4	Mechanical wiping	N	N	N	U	N	57b
6.4.2.1	Separated pickling and stripping	N	N	N	N	U	58
6.4.2.3	Zinc removal by ion exchange	N	N	N	N	U	59
6.4.2.5	Zinc removal by solvent extraction	N	N	N	N	U	59
6.4.2.6	Restricted operating range for hydrochloric acid open pickling baths	N	N	N	N	U	62d
6.4.2.7	Extraction by lateral hood or lip extraction	N	N	N	N	U	62b
6.4.2.8	Enclosed pretreatment section with extraction	N	N	N	N	U	62a
6.4.5.1	Optimised dipping time	N	N	N	N	U	60
6.4.5.2	Slow withdrawal of workpieces from the bath	N	N	N	N	U	60
6.4.5.4	Recovery and use of zinc-containing particles from steam blow-off (tube finishing)	N	N	N	N	U	61
8.1.1	Environmental management system (EMS)	U	U	U	U	U	1
8.1.3	Chemicals management systems	U	U	U	U	U	3
8.2.2	Monitoring of emissions to water	U	U	U	U	N	8
8.2.3	Monitoring of channelled emissions to air	U	U	U	U	U	7
8.3.1	Set-up and implementation of a plan for the prevention and control of leaks and spillages	U	U	U	U	U	4a
8.3.2	Use of oil-tight trays or cellars	U	U	U	U	U	4b
8.3.3	Prevention and handling of acid spillages	U	U	U	U	U	4c

NB:
U: Reported to be used at the time of writing; N: Reported as not used at the time of writing; NI: No information.

KEY POINT: Not all BATC's in the 'General BAT Conclusions' may be relevant to a batch galvanizing installation. The term 'general' in fact applies to BATCs that are applicable to more than one sub-sector and not to all sub-sectors. If in doubt, refer to Table 11.1 of the BREF (Annex II to this document)

KEY POINT: Because a BATC may be relevant to both batch galvanizing and hot dip coating (continuous galvanizing) then the BATC appears as a 'General BAT Conclusion' but may be very specific to the galvanizing process.

2.3 GENERAL BAT CONCLUSIONS OF RELEVANCE TO PERMITTING OF A BATCH GALVANIZING INSTALLATION

The following BATCs are considered not relevant for batch galvanizing installations because either (i) they refer to activities/flows that are not relevant to batch galvanizing or (ii) the BATC is listed as 'general' because it is relevant to two or more other FMP sub-sectors:

BAT 8; BAT 17; BAT 21; BAT 23; BAT 24; BAT; 25; BAT 27; BAT 29; BAT 30; BAT 31; BAT 37.

Note that BAT 31 (emissions to water) applies to process water emissions - which was not considered a 'key environmental issue' for batch galvanizing plants because there is normally no continuous process water discharge. The techniques and BAT-AELs in BAT 31 are therefore not applicable to batch galvanizing. Supporting evidence for this is found in Table 11.1, entries 8.9.1 to 8.9.13 which are all marked 'N' for batch galvanizing.

The following general BATCs are partially or fully relevant to batch galvanizing:

BAT #	SUBJECT
	General environmental performance
BAT 1	Environmental Management System (EMS)
BAT 2	Inventory of process chemicals, waste (as part of the EMS)
BAT 3	Chemical management system (as part of the EMS)
BAT 4	Emissions to soil and groundwater – plans for prevention of leaks or spillage (as part of EMS)
BAT 5	OTNOC[1] management plan (as part of the EMS)
	Monitoring
BAT 6	Monitoring of consumption of water, energy, materials; generation of waste water, residues and waste
BAT 7	Monitoring of channelled emissions to air
	Hazardous substances
BAT 9	Avoidance of use of $Cr6^{+}$ in passivation
	Energy efficiency
BAT 10	Energy efficiency plan and audit
BAT 11*	Energy efficiency in heating

[1] Other Than Normal Operating Conditions

	Material efficiency
BAT 12	Materials efficiency in degreasing
BAT 13	Materials efficiency in pickling (when heated)
BAT 14 *	Materials efficiency in pickling
BAT 15	Materials efficiency in fluxing
BAT 16	Materials efficiency of zinc during galvanizing
BAT 18	Recovery of spent pickling acids
	Water use and waste water generation
BAT 19	Water consumption and waste water generation
	Emissions to air
BAT 20	Dust emissions to air from heating
BAT 22*	NOx emissions to air
BAT 26 *	Dust emissions to air from galvanizing bath
BAT 28	Emissions to air from post treatment
	Noise and vibrations
BAT 32	Noise and vibration plan (as part of EMS)
BAT 33	Prevention of noise and vibration
	Residues
BAT 34	Waste reduction
BAT 35	Recycling of zinc residues
BAT 36	Storage of zinc residues
* Denotes a BAT that includes a quantitative BAT-AEL, BAT-AEPL or indicative limit that is specifically relevant to a batch galvanizing installation	

2.4 IDENTIFYING BAT-AELS AND BAT-AEPLS FOR A BATCH GALVANIZING INSTALLATION

As identified in section 2.1 and 2.2, the quantitative requirements for permit setting for batch galvanizing installations are found in both the general BATCs and the specific BATCs for batch galvanizing.

Details of the BAT-AELs and BAT-AEPLs for batch galvanizing installations are given in **Annex I** to this guidance document.

3. DETAILED GUIDANCE AND INTERPRETATION FOR INDIVIDUAL BATCs

This section of this guidance does not attempt to provide details of every aspect of the implementation of each BATC. This section highlights specific considerations for batch galvanizing installations and provides explanations arising from the development of the BREF and BAT Conclusions.

3.1 GENERAL BAT CONCLUSIONS

3.1.1 General environmental performance

BAT 1 – Environmental Management System

This BAT does not distinguish between the very large variations in size and nature of FMP Installations – which range form large integrated steelworks to small batch galvanizing plants. However, the 'Applicability' clause clearly indicates that the extend of the EMS can be expected to recognise the simplicity of a batch galvanizing installation:

"*The level of detail and the degree of formalisation of the EMS will generally be related to the nature, scale and complexity of the installation, and the range of environmental impacts it may have*."

Notes:

- an EMAS accredited EMS would demonstrate the implementation of BAT 1
- the EMS embraces the plans referred to in BAT 2; BAT 3; BAT 4; BAT 5; BAT 10; BAT 19; BAT 32; BAT 34

BAT 2 - Inventory of process chemicals, waste water and waste gas streams

Notes:

- This inventory will form the basis of the CMS (BAT 3)
- Section ii: for waste water will normally not be relevant for batch galvanizing installations that do not have a process waste water flow.
- Section iv (b): The 'relevant substances' in waste gas streams would normally be those for which monitoring is required for emissions to air - NOx and CO (heating of the galvanizing kettle); HCl (from enclosed pre-treatment or if any channelled emission exists); dust and zinc (from the galvanizing bath). See also BAT 7.
- A similar Applicability' clause (as BAT 1) also applies to the inventory.

BAT 3 – Chemical Management System (CMS)

Notes:

- Examples of CMS that have been implemented by batch galvanizing installations have been presented as part of EGGA's input to a workshop with the European Chemicals Agency in February 2023. Details available from National Associations.
- A similar Applicability' clause (as BAT 1) also applies to the CMS

- Section i (a): Note that '*eliminability*' refers to the behaviour of the substance in the environment. This term does not refer to the possibility to substitute the substance. There has been some confusion with the use of this term.

BAT 4 – Plans and actions for prevention of leaks and spillages

Notes:

- Section a.: Requires a plan for prevention of leaks and spillages as part of the EMS
- The 'Applicability' clause is given in the 'Applicability column of section a.
- Section b: In most cases, these techniques are relevant to other FMP sub-sectors and not to batch galvanizing
- Section c: Relevant to storage of fresh and spent HCl

BAT 5 – OTNOC Management Plan

Notes:

- OTNOC = Other Than Normal Operating Conditions
- There is no 'Applicability' clause for the size/nature of the installation for BAT 5 – but the required plan is 'risk-based' and can reflect the relative simplicity of the batch galvanizing installation and its low potential to pollute.
- The OTNOC plan is likely to focus on the monitoring and maintenance of the fabric filters for control of dust emissions to air and the operation of wet scrubbers for control of HCl emissions to air.

3.1.2 Monitoring

BAT 6 - Monitoring of consumption of water, energy, materials; generation of waste water, residues and waste

Notes:

- BAT 6 is expected to be simple to implement for a batch galvanizing installation
- Generation of waste (process) water is expected to be zero for a batch galvanizing installation (see BAT 63)

BAT 7 – Monitoring of channelled emissions to air

BAT 7 details monitoring requirements that arise from the setting of BAT-AELs and other requirements throughout the BAT Conclusions. The table presented includes monitoring requirements for all FMP sub-sectors - that may not be relevant to batch galvanizing installations. See Annex I for details of the monitoring requirements, including interpretation aspects, from BAT 7 for batch galvanizing installations.

Notes (see also Annex I):

- The term 'hot dipping after fluxing' is included for dust emissions because only some continuous galvanizing installations utilise a pre-flux prior to the galvanizing bath.

3.1.3 Hazardous substances

BAT 9 – Avoidance of the use of hexavalent chromium in passivation

The 'Applicability' clause refers to situations where hexavalent chromium may remain necessary for passivation in specific applications. This clause was mainly included for the use of hexavalent chromium passivation in certain continuous galvanizing plants.

3.1.4 Energy efficiency

BAT 10 - Energy efficiency plan and audit

- The 'Applicability' clause is given in the 'Applicability column of sections a and b.
- The setting of "*key performance indicators on an annual basis (e.g. MJ/t of product)*" should take account of the influence of production throughput and the recognition of the influence of changes in production volume per unit of kettle capacity that is given in footnote (2) to Table 1.4

BAT 11 – Energy Efficiency in Heating

This BAT includes a large number of techniques for energy efficiency that are relevant to more than one FMP sub-sector. Importantly, there are many techniques that are not relevant to batch galvanizing. The wording of the BAT statement is important: "*appropriate combination of the techniques..*" and makes clear that not all techniques are appropriate for a specific sub-sector or installation.

Notes:

- To identify appropriate techniques – see entries 8.5.3.1 to 8.5.4.4 in Table 11.1 of the main BREF.
- Table 11.1 clarifies that techniques a.; f.; k. and n. are not relevant
- Technique k. refers to hot rolling operations and not batch galvanizing
- The monitoring of energy consumption is a requirement of BAT 6

BAT 11 includes a BAT-AEPL for energy consumption. This is given in Table 1.4:

BAT-associated environmental performance level (BAT-AEPL) for specific energy consumption in batch galvanising

Specific process(es)	Unit	BAT-AEPL (Yearly average)
Batch galvanising	kWh/t	300–800 (1) (2) (3)

(1) The higher end of the BAT-AEPL range may be higher when centrifugation is used to remove the excess zinc and/or when the galvanising bath temperature is higher than 500 °C.
(2) The higher end of the BAT-AEPL may be higher and up to 1 200 kWh/t for batch galvanising plants operating at an average yearly production throughput below 150 t/m³ of kettle volume.
(3) In the case of batch galvanising plants producing mainly thin products (e.g. < 1,5 mm), the higher end of the BAT-AEPL range may be higher and up to 1 000 kWh/t.

The BAT-AEPL range of 300-800 kWh/t was the result of the data collection process in development of the BREF. The EIPPCB Technical Working Group for the BREF had some difficulty to understand the wide range of size/configuration of batch galvanizing installations across the EU and the effect of plant size, work mix and shift patterns on measures of specific energy consumption. It was also likely that the data sample was not fully representative of the range of plants across the EU. These discussions led to the inclusions of three footnotes to Table 1.4 that attempt to reflect the variables that influence energy consumption beyond the control of the operator:

Footnote (1): The upper end of the BAT-AEL (800 kWh/t) is not applicable for (i) centrifuge galvanizing plants and (ii) high temperature galvanizing plants (defined as > 500C).

Footnote (2): Energy consumption may be up to 1200 kWh/t if the annual production is below 150 t/m^3. This threshold was identified to accommodate some plants in the BREF data collection that operated single shifts and with larger kettles. See Fig 6.5 of the BREF. See also Section 11.7 of the BREF for calculation method for annual throughput.

Footnote (3): Recognises that work mix can also influence energy consumption. The EIPPCB Technical Working Group had limited data to establish this footnote and the extension of the upper value to 1000 kWh/t was based on a small number of plants in the data collection. To recognise the lack of precise data, precise definitions of the work mix were intentionally avoided – the definition of 'thin products' as <1.5mm is only an example and may be a thicker value in some plants. The word 'mainly' was also intentionally used to reflect that the proportion of 'thin' products that would influence energy consumption may differ from plant to plant (due to the influence of other factors).

If a plant falls above the upper end of the BAT-AEPL, it likely that one of these three footnotes applies.

3.1.5 Material Efficiency

BAT 12 – Materials efficiency in degreasing

Notes:

- No BAT-AEPL
- Technique a: Applicability clause in 3rd column of technique a. recognises that a general batch galvanizing plant cannot control the level of degreasing required for incoming steel products.
- Technique b: Refers only to 'hot dip coating' which is continuous galvanizing (not batch galvanizing)

BAT 13 – Material efficiency in pickling when acid is heated

Notes:

- No BAT AEPL (see BAT 14)
- The main purpose of this BAT is to avoid the direct injection of steam for heating of acid in bulk pickling of cold rolled steel.
- This BAT has partial relevance to batch galvanizing when heating pickling tanks.

BAT 14 – Materials efficiency in pickling

Notes:

- To identify appropriate techniques – see entries 8.6.2.2 to 8.6.2.12 in Table 11.1 of the main BREF.
- Table 11.1 clarifies that techniques a.; b.; c. and i. are not relevant
- The monitoring of HCl consumption may be a requirement of BAT 6

BAT-associated environmental performance level (BAT-AEPL) for specific pickling acid consumption in batch galvanising

Pickling acid	Unit	BAT-AEPL (3-year average)
Hydrochloric acid, 28 wt-%	kg/t	13–30 (1)

(1) The higher end of the BAT-AEPL range may be higher and up to 50 kg/t when galvanising mainly workpieces with a high specific surface area (e.g. thin products < 1,5 mm, tubes with a wall thickness < 3 mm) or when regalvanising is carried out.

Footnote (1) Recognises that, BAT 14 includes a BAT-AEPL for HCl acid consumption. This is given in Table 1.5:
for reasons of work mix, there are many galvanizing plants that would reasonably exceed the upper end of the BAT-AEPL (30kg/tonne).

Note that the BAT-AEPL is set at 28 wt% and a conversion will be needed if fresh acid is purchased at different concentrations.

BAT 15 – Materials efficiency in fluxing

Notes:

- No BAT-AEPL
- Attention is drawn to the applicability clauses in the 3rd column.

BAT 16 – Materials efficiency of zinc during galvanizing

Notes:

- No BAT-AEPL
- Techniques are considered normal best practice in batch galvanizing
- 3rd technique in technique c is only relevant to continuous wire galvanizing plants.

BAT 18 – Recovery of spent pickling acids

Notes:

- Table 11.1 does not provide adequate detail to identify techniques that are not relevant to batch galvanizing
- Techniques such as spray roasting and fluidised bed reactors may be used in bulk pickling of cold rolled steel. They are not used in batch galvanizing plants. Supportive evidence for this can be found in section 8.6.5 of the BREF and, in particular, the applicability statement on page 632 of the BREF.

In recognition that markets for recovery of spent acid are highly region-specific and may not always exist, there is an Applicability clause for batch galvanizing to recognise that on or off-site neutralisation may be only option available: "*In batch galvanising, if the use of spent pickling acid as a secondary raw material is restricted by market unavailability, neutralisation of spent pickling acid may exceptionally take place.*"

3.1.6 Water use and waste water generation

BAT 19 – Water consumption and waste water generation

Notes:

- No BAT-AEPL for batch galvanizing - BAT-AEPLs apply only to other FMP sub-sectors in recognition that water use in batch galvanizing is low and not considered a key environmental issue.
- See Table 11.1, entries 8.7.1 to 8.7.6 to identify that techniques a; b; c; d are not relevant to batch galvanizing

3.1.7 Emissions to air

BAT 20 – Dust emissions to air from heating

Notes:

- No BAT-AEL for batch galvanizing - BAT-AELs apply only to other FMP sub-sectors
- This BAT will normally be met with natural gas or electrically-heated galvanizing kettles (technique a)
- Technique b is for hot rolling operations and not for batch galvanizing

BAT 22 – NOx emissions to air

This BAT arises from attention to other FMP sub-sectors where NOx emissions arise from significantly higher temperature processes (eg hot rolling). Despite evidence that mass flows of NOx for batch galvanizing furnaces are very low, a BAT-AEL was set. An indicative limit of CO was also set (not a BAT-AEL).

Notes:

- Table 11.1, entries 8.8.2.5 to 8.8.2.14, identifies many listed techniques as not relevant to batch galvanizing

- The use of 'Low NOx furnaces' for batch galvanizing in the BREF data collection is considered by EGGA as misleading – because many respondents understood their furnaces to be inherently 'low NOx' and were not fitting the description of low NOx burners detailed in the BREF (8.8.2.8).
- See section 11.9 of the BREF for comparison of viability of techniques to control furnace NOx emissions

BAT 22 includes a BAT-AEL for NOx emissions to air and an indicative limit for CO emissions of the furnace. This is given in Table 1.13:

BAT-associated emission level (BAT-AEL) for channelled NOX emissions to air and indicative emission level for channelled CO emissions to air from heating the galvanising kettle in batch galvanising

Parameter	Unit	BAT-AEL (Daily average or average over the sampling period)	Indicative emission level (Daily average or average over the sampling period)
NO_x	mg/Nm³	70–300	No indicative level
CO	mg/Nm³	No BAT-AEL	10–100

The correct conversion of measured emissions to the reference oxygen concentration of 3% O_2 is vital for proper evaluation of this BAT-AEL for batch galvanizing plants. When properly evaluated, it is unlikely that a batch galvanizing furnace will exceed 300 mg/Nm³.

BAT 26 – Dust emissions to air from galvanizing bath

Techniques described for control of emissions of dust (particulates) to air are those typically used in batch galvanizing plants in Europe. A simplified explanation of the required techniques is:

- All plants would control emissions 'at source; through minimising carry-over of flux solution to the galvanizing bath.
- An additional technique to control emissions 'at source' is the use of a low fume flux – but this is not required for all plants.
- All plants would collect emissions by either:
  - Air extraction close to the kettle, or
  - Enclosure of the kettle with air extraction
- All plants would operate a fabric filter to treat the collected emissions.

BAT 26 includes a BAT-AEL for dust emissions to air. This is given in Table 1.17:

BAT-associated emission level (BAT-AEL) for channelled dust emissions to air from hot dipping after fluxing in hot dip coating of wires and in batch galvanising

Parameter	Unit	BAT-AEL (Daily average or average over the sampling period)
Dust	mg/Nm³	< 2–5

Note that the term 'hot dipping after fluxing' is used to distinguish between wire galvanizing using a flux and wire galvanizing without flux.

BAT 28 – Emissions to air from post-treatment

This BAT was primarily intended for post-treatment in continuous hot dip coating installations. It is unlikely to be relevant to batch galvanizing installations.

- Technique a is only applicable to spraying or when volatile substances are used.
- Technique b is specific to continuous hot dip coating post-treatment – see Table 11.1. entry 5.4.1.5.3

3.1.8 Noise and vibrations

BAT 32 – Noise and vibration plan

Note the applicability clause:

"The applicability is restricted to cases where a noise or vibration nuisance at sensitive receptors is expected and/or has been substantiated."

BAT 33 – Prevention of noise and vibration

No further information provided.

3.1.9 Residues

BAT 34 – Waste reduction

Primary requirement is to have a residues management plan as part of the EMS (see BAT 1).

Majority of techniques listed (techniques b to g) are not considered relevant to batch galvanizing – see Table 11.1 entry 8.11.1.2 to 8.11.1.7. Technique h is only applicable if shot blasting is carried out on site.

The techniques relevant to support the residue management plan are given in BAT 35 and BAT 36.

BAT 35 – Recycling of zinc residues

Techniques b and c are considered routine business for a batch galvanizing installation.

Technique a was included in BAT 35 but it is recognised that opportunities to recycle filter dust is very limited and the volume generated is low. It is therefore recognised that "*Applicability may be restricted depending on the availability of a market.*"

Note that 'top dross' referred to in Technique b is for continuous galvanizing processes.

BAT 36 – Storage of zinc residues

When interpreting this BAT, EGGA's understanding from the EIPPCB Technical Working Group discussions is:

Technique	Interpretation
*impermeable surfaces, in enclosed areas and in closed containers/bags, for **fabric filter dust**,*	The principal requirement is for filter dusts to be stored in closed containers/bags. Because of this requirement, the area that they are stored in should be 'enclosed' but not necessarily 'covered' (because the cover is achieved by the container). The storage area may then have walls/fence but not a roof.
*impermeable surfaces and in covered areas protected from surface run-off water, for **all the other residue types** above.*	The emphasis is on the 'covered' area as the containers may be open (ie drums). The storage area should be covered but may not have walls/fence.

3.2 SPECIFIC BAT CONCLUSIONS FOR BATCH GALVANIZING INSTALLATIONS

3.2.1 Residues

BAT 58 Spent acid/separate stripping

This BAT describes the need to avoid spent acids with high zinc content where that high zinc content may restrict the suitability of waste acid for recycling in, for example, water treatment applications. EGGA observed to the EIPPCB Technical Working Group that the BAT statement is not well-written in this regard.

The requirement is to carry out separate stripping if such a technique would facilitate recycling of the waste acid.

Note the applicability clause: "*Applicability to existing plants may be restricted by a lack of space in the event that additional tanks for stripping are needed.* "

BAT 59 Spent stripping solutions

IMPORTANT: BAT 59 contains a significant error that was brought to the attention of EIPPCB by EGGA. The techniques described and the BAT statement were wrongly drafted by EIPPCB based on a misunderstanding of the term 'stripping solution' within the main BREF. Regrettably, this error could not be corrected after the TWG Final Meeting.

EGGA recommends that batch galvanizing installations and permitting authorities ignore BAT 59. A full explanation is given in Annex III.

3.2.2 Material efficiency

BAT 60 Material efficiency during dipping

These techniques would be considered normal business in a batch galvanizing installation.

BAT 61 Material efficiency (tube galvanizing)

These techniques would be considered normal business in a semi-automatic tube galvanizing installation.

3.2.3 Emissions to Air

BAT 62 HCl emissions to air from pickling

This BAT reflects the outcome of a complex discussion on the different configurations of pickling operations within a batch galvanizing installation. Interpretation of the BAT 62 is therefore complex. The techniques fulfilling the objectives of BAT62 can be summarised as:

- Fully enclosed pretreatment with extraction combined with wet scrubber and demister – creating a channelled emission subject to the BAT-AEL
- Extraction by lateral hood or lip extraction at the edge of open, or partially enclosed, pickling tanks combined with wet scrubber and demister – creating a channelled emission subject to the BAT-AEL
- Control of the temperature and concentration of open pickling baths in order to maintain the combination of temperature/concentration within a restricted range. This technique is only BAT for existing plants, where it can be demonstrated to give equivalent protection of the environment as the other techniques available[2] (see also footnote 6 to BAT 7).

In addition, the operation of open pickling baths must be accompanied by:

- Daily measurement of the pickling bath temperature
- Measurement of the pickling bath's HCL concentration when replenished and also weekly.
- Minimisation of movement of air across the bath surface, to limit evaporation.

BAT 62 includes a BAT-AEL for channelled HCl emissions to air[3]. This is given in Table 1.29:

BAT-associated emission level (BAT-AEL) for channelled HCl emissions to air from pickling and stripping with hydrochloric acid in batch galvanising

Parameter	Unit	BAT-AEL (Daily average or average over the sampling period)
HCl	mg/Nm³	< 2–6

[2] Note that EGGA and Spain, supported by Portugal and Italy, recorded a 'Split View' opposing this conclusion for open pickling baths at the IED Article 13 Forum prior to publication of the BAT Conclusions. Details are given in the BREF document.
[3] Note that EGGA recorded a 'Split View' opposing the upper end of the BAT-AEL range on the basis that the data collection supported a higher upper limit of 10mg/Nm³. Details are given in the BREF document.

3.2.4 Waste water discharge

BAT 63 Waste water

This BAT reflects that discharges of process waste water do not arise from batch galvanizing installations and that liquid wastes are normally removed by tanker for external recovery or disposal.

4. REFERENCES

1. COMMISSION IMPLEMENTING DECISION (EU) 2022/2110 of 11 October 2022 establishing the best available techniques (BAT) conclusions, under Directive 2010/75/EU of the European Parliament and of the Council on industrial emissions, for the ferrous metals processing industry [FMP BAT CONCLUSIONS]

2. Aries, E., Gómez Benavides, J., Mavromatis, S., Klein, G., Chronopoulos, G. and Roudier, S.,, Best Available Techniques (BAT) Reference Document for the Ferrous Metals Processing Industry, Publications Office of the European Union, Luxembourg, 2022, doi:10.2760/196475, JRC131649 [FMP BREF]

Annex I

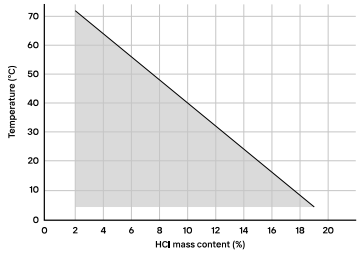
Quantitative Requirements and Associated Monitoring

FMP BAT CONCLUSIONS – BATCH GALVANIZING

QUANTITATIVE REQUIREMENTS AND ASSOCIATED MONITORING

EMISSIONS TO AIR: BEST AVAILABLE TECHNIQUE – ASSOCIATED EMISSION LIMITS & MONITORING

Pollutant	**Activity**	**BAT-AEL** *Mandatory for permits (unless indicated)*	**Monitoring Requirement**	**BAT reference** (for techniques)	**NOTES**
Dust	Galvanizing Kettle	BAT-AEL: <2 – 5 mg/Nm^3	Annual (*can be reduced to every 3 years if proven sufficiently stable*).	BAT 26	
Zinc		No BAT-AEL		-	Monitoring requirement for Zn is included as this is often reported with dust emissions. No BAT-AEL was set for Zn emissions to air.
CO	Heating of Galvanizing Kettle	No BAT-AEL Indicative level: 10 – 100 mg/Nm^3	Annual *(Not required for electric heated kettles)*	BAT 22	
NO_x		BAT-AEL 70 – 300 mg/Nm^3		BAT 22	Measurements at reference level of 3% oxygen, to be corrected as: $E_R = \frac{21 - O_R}{21 - O_M} \times E_M$ where: E_R: emission concentration at the reference oxygen level O_R; O_R: reference oxygen level in vol-%; E_M: measured emission concentration; O_M: measured oxygen level in vol-%. Formula not to be used when measured oxygen concentration approaches 21% O_2.
HCl	Pickling and stripping – *enclosed pre-*	BAT-AEL: <2 – 6 mg/Nm^3	Annual	BAT 62	

Pollutant	Activity	BAT-AEL *Mandatory for permits (unless indicated)*	Monitoring Requirement	BAT reference (for techniques)	NOTES
	treatment or hood/lip extraction to channelled emission				
	Pickling and stripping – *open pickling baths with no channelled emission*	Upper limits for HCl concentration and temperature of pickling bath given by formula in BAT 62	Annual measurement of the HCl concentration in the gaseous phase above the pickling baths. Bath temperature: daily measurement Bath concentration: Weekly and after each replenishment	BAT 62	 Chart given in Fig 6.29 (p487) of main BREF represents the limits given in formula of BAT62. Only applicable for existing plants. Annual measurement of gaseous phase is not intended to be directly assessed against the BAT-AEL for channelled emissions after treatment. The use of control of temperature/concentration should demonstrate an equivalent outcome to use of enclosure and wet scrubber - which may be assumed by measurements/checks of temperature and concentration.
SO_x	Pickling and stripping (with sulphuric acid)	No BAT-AEL	Annual (channelled emission only)	BAT 24	This monitoring requirement was added for the possibility that sulphuric acid pickling may be carried (eg for tube galvanizing), but there was insufficient data to set a BAT-AEL and no techniques are described in BAT 24.
	Additional Information • <u>Definition of periodic sampling (applies to all above)</u>*:* Average value of three consecutive measurements of at least 30 minutes each. [*For any parameter where, due to sampling or analytical limitations and/or due to operational conditions, a 30-minute sampling/*				

Pollutant	Activity	BAT-AEL *Mandatory for permits (unless indicated)*	Monitoring Requirement	BAT reference (for techniques)	NOTES
	measurement and/or an average of three consecutive measurements is inappropriate, a more representative sampling/measurement procedure may be employed] • The FMP BREF Technical Working Group did not consider emissions to air of ammonia or lead to be key environmental issues for batch galvanizing. No data was collected and no monitoring or emission limits were set for these pollutants.				

OPERATING EFFICIENCY: BEST AVAILABLE TECHNIQUE – ASSOCIATED ENVIRONMENTAL PERFORMANCE LEVELS

	Activity	BAT-AEPL *Not mandatory for permits*	Basis	BAT reference for techniques	NOTES
ENERGY	Total Plant	300 – 800 kWh/tonne of steel processed Level can be higher (no upper level identified) for (i) centrifuge plants and/or high temperature galvanizing (>500° C) Level can be up to 1200 kWh/tonne when annual throughput < 150 tonnes/ m^3 kettle capacity [*concession for low demand scenario*] Level can be up to 1000 kWh/tonne when plant work mix is mainly thin products [*concession for work mix*]	Average over 3 years	BAT 11 b; c; d; e; l; j; l; m; n	Applies to both normal temperature and high temperature centrifuge plants which can have specific energy levels significantly in excess for 2000 – 3000 kWh/tonne See Figure 6.5 of main BREF document for the basis of the concession up to1200 kWh/tonne. The terms 'mainly' and 'thin' are not defined as this was not possible from the data collection. It is left to plant-specific judgement, but the example of <1.5mm is given to define thin work.

	Activity	BAT-AEPL *Not mandatory for permits*	Basis	BAT reference for techniques	NOTES
HYDROCHLORIC ACID CONSUMPTION	Pickling and stripping	13 – 30 kg / tonne steel processed Level can be up to 50 kg / tonne when mainly plant work mix is mainly thin products or where regalvanizing is carried out	Average over 3 years. 28 wt% HCl	BAT 14 d; e; f; h; j; k	The terms 'mainly' and 'thin' are not defined as this was not possible from the data collection. It is left to plant-specific judgement, but the examples of <1.5mm and tubes < 3mm are given to define thin work. Regalvanizing is defined as: "The processing of used galvanised articles (e.g. highway guard rails) that are returned to be galvanised after long service periods. Processing of these articles requires additional process steps due to the presence of partly corroded surfaces or the need to remove any residual zinc coating."

Annex II

Table 11.1 ‘Information on the reported use of BAT in the various FMP sectors’, Chapter 11.1, FMP BREF 2022

11.4 Information on the reported use of BAT in the various FMP industrial sectors

The following table contains information as submitted by the FMP TWG on the current use of techniques that are presented in the BAT conclusion chapter of this document for the various FMP sectors. The information in this table represents the available knowledge of the FMP TWG on which BAT are currently used (at the time of writing) in the various FMP sectors in the Member States of the European Union. It cannot be considered an indication of the applicability of those BAT as per IED Article 3(10)(b). Applicability information can be found in the applicability clauses of the BAT conclusions chapter of this document (Chapter 9) as well as in the detailed descriptions of the techniques in Sections X.4 for the sector-specific techniques to be considered in the determination of the BAT (i.e. Sections 2.4, 3.4, 4.4, 5.4 and 6.4) or in Chapter 8 for techniques applied in more than one sector.

Table 11.1: Information on the reported use of BAT in the various FMP sectors

BREF section number	Title of technique	Hot rolling	Cold rolling	Wire drawing	Continuous hot dip coating	Batch galvanising	Relevant BAT number in Chapter 9
2.4.1.1	Enclosed scarfing (other than manual scarfing) combined with air extraction and waste gas treatment	U	N	N	N	N	42a
2.4.1.2	Enclosed grinding combined with air extraction and waste gas treatment	U	N	N	N	N	42a
2.4.1.3	Computer-aided quality control (CAQC)	U	N	N	N	N	40a
2.4.1.4	Edging or trimming of wedge-type slabs	U	N	N	N	N	40c
2.4.1.5	Slab slitting	U	N	N	N	N	40b
2.4.2.1	Process gas management system	U	U	N	U	N	20b, 21, 22
2.4.2.5	Oxy-fuel combustion	U	N	N	U	N	11h, 22h
2.4.2.6	Flameless combustion	U	N	N	U	N	11i, 22g
2.4.2.7	Pulse-fired burner	U	N	N	N	U	11j
2.4.2.8	Low-NO_X burners	U	U	U	U	U	22d
2.4.2.9	Selective catalytic reduction (SCR)	U	U	N	N	N	22i
2.4.2.10	Selective non-catalytic reduction (SNCR)	U	N	N	N	N	22j
2.4.2.11	Flue-gas recirculation (FGR)	U	N	N	N	N	22e
2.4.2.14	Heat recovery from skids cooling	U	N	N	N	N	38c
2.4.2.15	Heat conservation during transfer of feedstock	U	N	N	N	N	38d
2.4.2.16	Hot/direct charging	U	N	N	N	N	38b
2.4.2.17	Near-net-shape casting for thin slabs followed by rolling	U	N	N	N	N	38a, 39f
2.4.2.18	Near-net-shape casting for beam blanks followed by rolling	U	N	N	N	N	38a, 39f
2.4.3.1	Water spray descaling triggered by sensors	U	N	N	N	N	19h
2.4.4.1	Sizing press	U	N	N	N	N	38g, 39a
2.4.5.1	Computer-aided rolling optimisation	U	U	N	N	N	39b, 44c
2.4.6.1	Coil boxes	U	N	N	N	N	38e, 39d

2.4.6.2	Coil recovery furnaces	U	N	N	N	N	38f
2.4.7.1	Crop optimisation	U	N	N	N	N	41a
2.4.7.11	Control of the feedstock shape during rolling	U	N	N	N	N	41b
2.4.7.14	Three-roll stand	U	N	N	N	N	39e
2.4.7.2	Reduction of the rolling friction	U	N	N	N	N	39c
2.4.7.8	Air extraction as close as possible to the source for mechanical processes and welding combined with waste gas treatment	U	N	N	N	N	42b
2.4.10.1	Treatment of grinding sludge	U	U	N	N	N	37b
2.4.10.1	Recycling of worn working rolls	U	U	N	N	N	37c
2.4.11.2	Treatment and reuse of scale- and oil-bearing process water in hot rolling	U	N	N	N	N	19g
3.4.1.2	Air extraction as close as possible to the source for emissions from decoiling and mechanical predescaling	N	U	N	N	N	46
3.4.2.1	Continuous rolling for low-alloy and alloy steel	N	U	N	N	N	44a
3.4.2.3	Optimal choice of rolling oil and emulsion system	U	U	N	N	N	45d
3.4.2.4	Reduction of the rolling friction	N	U	N	N	N	44b
3.4.2.5	Monitoring and adjustment of the rolling emulsion quality	N	U	N	N	N	45a
3.4.2.6	Prevention of contamination of the rolling emulsion	N	U	N	N	N	45b
3.4.2.7	Minimisation of oil/rolling emulsion consumption	N	U	N	N	N	45e
3.4.2.8	Cleaning and reuse of the rolling emulsion	N	U	N	N	N	45c
3.4.2.9	Treatment of spent rolling emulsion	N	U	N	N	N	45c
3.4.2.10	Air extraction as close as possible to the source for emissions from rolling	N	U	N	N	N	48
3.4.3.4	Low-NO_X burner for annealing furnaces	N	U	N	N	N	22d
3.4.3.5	Selective catalytic reduction (SCR) in continuous annealing lines	N	U	N	N	N	22i

3.4.4.2	Dry tempering and low-volume lubrication in wet tempering	N	U	N	N	N	47
3.4.4.4	Air extraction as close as possible to the source for emissions from wet tempering	N	U	N	N	N	48
3.4.5.2	Air extraction as close as possible to the source for emissions from levelling and welding	N	U	N	N	N	46
3.4.6.1	Cleaning and reuse of grinding emulsion	U	U	N	N	N	37a
4.4.1.2	Recovery and reuse of shot blast media	U	N	U	N	N	34h
4.4.3.1	Enclosed drawing machine combined with air extraction and abatement	N	N	U	N	N	52a
4.4.3.2	Air extraction in wire drawing as close as possible to the emission source	N	N	U	N	N	52b
4.4.4.2	Cleaning of drawing lubricant / coolant	N	N	U	N	N	50
4.4.6.1	Floating protective layers or tank covers in the lead baths	N	N	U	N	N	49, 51b
4.4.6.2	Minimisation of carry-over of lead	N	N	U	N	N	51a
4.4.6.3	Air extraction as close as possible to the source and treatment of lead bath emissions	N	N	U	N	N	51c
4.4.8.2	Air extraction as close as possible to the source for emissions from oil quench baths	N	N	U	N	N	53a
5.4.1.1.3	Use of a direct-flame furnace in the case of hot dip coating of sheets	N	N	N	U	N	12b
5.4.1.3.1	Air knives for coating thickness control	N	N	N	U	N	56a
5.4.1.3.2	Stabilisation of the strip	N	N	N	U	N	56b
5.4.1.5.1	Cleaning and reuse of the phosphating or passivation solution	N	N	N	U	N	17a
5.4.1.5.2	Air extraction as close as possible to the source from chemical baths and tanks in post-treatment (i.e. phosphating and passivation)	U	U	U	U	U	28a

5.4.1.5.3	Closed tanks combined with air extraction in the case of continuous post-treatment	N	N	N	U	N	28b
5.4.1.5.4	Minimisation of drag-out of chemical solution	N	N	N	U	N	17c
5.4.1.5.5	Use of roll coaters for strips	N	N	N	U	N	17b
5.4.3.2.3	Air or nitrogen wiping	N	N	N	U	N	57a
5.4.3.2.4	Mechanical wiping	N	N	N	U	N	57b
6.4.2.1	Separated pickling and stripping	N	N	N	N	U	58
6.4.2.3	Zinc removal by ion exchange	N	N	N	N	U	59
6.4.2.5	Zinc removal by solvent extraction	N	N	N	N	U	59
6.4.2.6	Restricted operating range for hydrochloric acid open pickling baths	N	N	N	N	U	62d
6.4.2.7	Extraction by lateral hood or lip extraction	N	N	N	N	U	62b
6.4.2.8	Enclosed pretreatment section with extraction	N	N	N	N	U	62a
6.4.5.1	Optimised dipping time	N	N	N	N	U	60
6.4.5.2	Slow withdrawal of workpieces from the bath	N	N	N	N	U	60
6.4.5.4	Recovery and use of zinc-containing particles from steam blow-off (tube finishing)	N	N	N	N	U	61
8.1.1	Environmental management system (EMS)	U	U	U	U	U	1
8.1.3	Chemicals management systems	U	U	U	U	U	3
8.2.2	Monitoring of emissions to water	U	U	U	U	N	8
8.2.3	Monitoring of channelled emissions to air	U	U	U	U	U	7
8.3.1	Set-up and implementation of a plan for the prevention and control of leaks and spillages	U	U	U	U	U	4a
8.3.2	Use of oil-tight trays or cellars	U	U	U	U	U	4b
8.3.3	Prevention and handling of acid spillages	U	U	U	U	U	4c

8.3.5	Set-up and implementation of an OTNOC management plan to reduce emissions during OTNOC	U	U	U	U	U	5
8.4.1	Avoiding the use of hexavalent chromium compounds in passivation	N	N	N	U	U	9
8.5.1	Energy efficiency plan and energy audits	U	U	U	U	U	10a
8.5.2	Energy balance record	U	U	U	U	U	10b
8.5.3.1	Optimum furnace design for feddstock heating	U	U	U	U	N	11a
8.5.3.2	Combustion optimisation	U	U	U	U	U	11d
8.5.3.3	Furnace automation and control	U	U	U	U	U	11e
8.5.3.4	Process gas management system	U	U	N	U	N	11f
8.5.3.5	Batch annealing with 100 % hydrogen	N	U	U	N	N	11g
8.5.3.6	Optimum galvanising kettle design	N	N	N	N	U	11b
8.5.4.1	Feedstock preheating	U	N	N	U	N	11k
8.5.4.2	Drying of workpieces	N	N	N	N	U	11l
8.5.4.3	Preheating of combustion air	U	U	N	U	U	11m
8.5.4.4	Waste heat recovery boiler	U	U	N	U	N	11n
8.6.1.1	Use of feedstock with low oil and grease contamination	N	N	U	U	U	12a
8.6.1.2	General techniques for increased degreasing efficiency	N	U	U	U	U	12c
8.6.1.3	Minimisation of drag-out of degreasing solution	N	U	U	U	U	12d
8.6.1.4	Reverse cascade degreasing	N	U	U	U	U	12e
8.6.1.5	Cleaning and reuse of the degreasing solution	N	U	U	U	U	12f
8.6.2.1	Acid heating with heat exchangers or by submerged combustion	N	U	U	N	U	13a, 13b
8.6.2.2	Minimisation of steel corrosion	N	U	U	N	N	14a
8.6.2.3	Mechanical predescaling	N	U	U	N	N	14b, 46
8.6.2.4	Electrolytic prepickling for high-alloy steel	N	U	N	N	N	14c
8.6.2.5	Rinsing after alkaline degreasing	N	N	N	N	U	14d

8.6.2.6	General techniques for increased pickling efficiency	N	U	U	N	U	14e
8.6.2.7	Cleaning of the pickling bath and reuse of acid acid	N	U	U	N	U	14f
8.6.2.8	Reverse cascade pickling	N	U	U	N	N	14g
8.6.2.9	Minimisation of drag-out of pickling acid	N	U	U	N	U	14h
8.6.2.10	Turbulence pickling	N	U	N	N	N	14i
8.6.2.11	Use of pickling inhibitors	N	U	U	N	U	14j
8.6.2.12	Activated pickling in hydrochloric acid pickling	N	U	N	N	U	14k
8.6.3.1	Rinsing of workpieces after pickling	N	N	N	N	U	15a
8.6.3.2	Optimised fluxing operation	N	N	N	N	U	15b
8.6.3.3	Iron removal and reuse of the fluxing solution	N	N	N	N	U	15d
8.6.3.4	Recovery of salts from the spent fluxing solution for production of fluxing agents	N	N	N	N	U	15e
8.6.3.5	Minimisation of drag-out of fluxing solution	N	N	N	N	U	15c
8.6.4.1	Reduction of the generation of bottom dross	N	N	N	U	U	16a
8.6.4.2	Prevention, collection and reuse of zinc splashes in batch galvanising	N	N	N	N	U	16b
8.6.4.3	Reduction of the generation of zinc ash	N	N	N	U	U	16c
8.6.5	Techniques to recover spent pickling acids	U	U	U	N	U	18
8.7.1	Water management plan and water audits	U	U	U	U	N	19a
8.7.2	Segregation of water streams	U	U	U	U	N	19b
8.7.3	Minimisation of hydrocarbon contamination of process water	U	U	U	U	N	19c
8.7.4	Reuse and/or recycling of water	U	U	U	U	N	19d
8.7.5	Reverse cascade rinsing	U	U	U	U	U	19e
8.7.6	Recycling or reuse of rinsing water	U	U	U	U	U	19f

8.8.1.1	Demister	U	U	U	U	U	23c, 24c, 28d, 48b, 53b
8.8.1.2	Electrostatic precipitator (ESP)	U	U	N	N	N	42c
8.8.1.3	Fabric filter	U	U	U	N	U	26e, 42d, 46b, 51d, 52c
8.8.1.4	Selective catalytic reduction (SCR) – Acid recovery	N	U	N	N	N	29e
8.8.1.6	Optimisation of the SCR design and operation	U	U	N	N	N	22k, 25g, 29f
8.8.1.7	Wet scrubbing	U	U	U	U	U	23b, 24c, 28c, 42e
8.8.2.1	Use of electricity generated from fossil-free energy sources for heating	U	U	U	U	U	20, 21, 22
8.8.2.1	Use of a fuel or a combination of fuels with low dust or ash content	U	U	U	U	U	20a
8.8.2.3	Limiting the entrainment of dust	U	N	N	U	N	20b
8.8.2.4	Use of a fuel or a combination of fuels with low sulphur content	U	U	U	U	U	21
8.8.2.5	Use of a fuel or a combination of fuels with low NO_X formation potential	U	U	U	U	U	22a
8.8.2.6	Furnace automation and control	U	U	U	U	U	22b
8.8.2.7	Combustion optimisation	U	U	U	U	U	22c
8.8.2.8	Low-NO_X burner	U	U	U	U	U	22d
8.8.2.9	Flue-gas recirculation	U	N	N	N	N	22e
8.8.2.10	Limiting the temperature of air preheating	U	U	N	U	U	22f
8.8.2.11	Flameless combustion	U	N	N	U	N	22g
8.8.2.12	Oxy-fuel combustion	U	N	N	U	N	22h
8.8.2.13	Selective catalytic reduction (SCR)	U	U	N	N	N	22i, 29e
8.8.2.14	Selective non-catalytic reduction (SNCR)	U	N	N	N	N	22j
8.8.3.1	Closed degreasing tanks combined with air extraction in the case of continuous degreasing	N	U	N	U	N	23a

8.8.4.1	Batch pickling in tanks equipped with lids or enclosing hoods combined with fume extraction	U	U	U	U	N	24b, 25d
8.8.4.2	Continuous pickling in closed tanks combined with fume extraction	U	U	U	U	N	24a, 25c
8.8.4.3	Wet scrubbing followed by a demister	U	U	U	U	N	24c, 29d, 62c
8.8.5.1	Nitric-acid-free pickling of high-alloy steel	U	U	N	N	N	25a
8.8.5.2	Addition of hydrogen peroxide or urea to the pickling acid	U	U	U	N	N	25b
8.8.5.3	Wet scrubbing with addition of an oxidising agent (e.g. hydrogen peroxide)	U	U	U	N	N	25e
8.8.5.4	Selective catalytic reduction (SCR) in mixed acid pickling	N	U	N	N	N	25f
8.8.6.1	Low-fume flux	N	N	N	N	U	26a
8.8.6.2	Minimisation of carry-over of the fluxing solution	N	N	N	N	U	26b
8.8.6.3	Air extraction as close as possible to the source	N	N	N	U	U	26c
8.8.6.4	Enclosed kettles combined with air extraction	N	N	N	U	U	26d
8.8.7.1	Electrostatic oiling	N	U	N	U	N	27a
8.8.7.3	Contact lubrication	N	U	N	N	N	27b
8.8.7.4	Oiling without compressed air	N	U	N	N	N	27c
8.8.8.1	Use of a fuel or a combination of fuels with low sulphur and/or nitrogen content – Acid recovery	N	U	N	N	N	29a
8.8.8.3	Combustion optimisation – Acid recovery	N	U	N	N	N	29b
8.8.8.4	Low-NO_X burners – Acid recovery	N	U	N	N	N	29c
8.8.8.5	Wet scrubbing followed by a demister – Acid recovery	N	U	N	N	N	29d
8.9.1	Adsorption	U	N	N	N	N	31d
8.9.2	Aerobic treatment	U	U	N	N	N	31h

8.9.3	Chemical precipitation	U	U	U	U	N	31e
8.9.4	Chemical reduction	U	U	N	U	N	31f
8.9.5	Coagulation and flocculation	U	U	U	U	N	31i
8.9.6	Equalisation	U	U	U	U	N	31a
8.9.7	Filtration	U	U	U	U	N	31k
8.9.8	Flotation	U	U	U	U	N	31l
8.9.9	Nanofiltration	U	N	N	N	N	31g
8.9.10	Neutralisation	U	U	U	U	N	31b
8.9.11	Physical separation	U	U	U	U	N	31c
8.9.12	Reverse osmosis	U	N	N	N	N	31g
8.9.13	Sedimentation	U	U	U	U	N	31j
8.9.14	Treatment of water contaminated with oil or grease	U	U	U	U	N	30
8.10.1	Noise and vibration management plan	U	U	U	U	U	32
8.10.2	Appropriate location of equipment and buildings	U	U	U	U	U	33a
8.10.3	Operational measures	U	U	U	U	U	33b
8.10.4	Low-noise equipment	U	U	U	U	U	33c
8.10.5	Noise and vibration control equipment	U	U	U	U	U	33d
8.10.6	Noise abatement	U	U	U	U	U	33e
8.11.1.1	Residues management plan	U	U	U	U	U	34a
8.11.1.2	Pretreatment of oily scale for further use	U	N	N	N	N	34b
8.11.1.3	Use of mill scale	U	N	U	N	N	34c
8.11.1.4	Use of metallic scrap	U	U	U	U	N	34d
8.11.1.5	Recycling of metal and metal oxides from dry waste gas cleaning	U	N	N	N	N	34e
8.11.1.6	Use of oily sludge	U	U	N	N	N	34f
8.11.1.7	Thermal treatment of hydroxide sludge from the recovery of mixed acid	N	U	N	N	N	34g
8.11.2.1	Recycling of fabric filter dust	N	N	N	U	U	35a
8.11.2.2	Recyling of zinc ash and top dross	N	N	N	U	U	35b
8.11.2.3	Recycling of bottom dross	N	N	N	U	U	35c

8.11.2.4	Environmental risk prevention from the storage of zinc-containing residues	N	N	N	U	U	36
8.11.3.1	Environmental risk prevention from the storage of lead-containing residues	N	N	U	N	N	55
8.11.3.2	Recycling of lead-containing residues from wire drawing	N	N	U	N	N	54
NB: U: Reported to be used at the time of writing; N: Reported as not used at the time of writing; NI: No information.							

Annex III

BAT 59 Error: Extract from EC Article 13 Forum, December 2021

Extract prepared by EGGA to record the notified error for BAT 59

OPINION OF THE FORUM FOR THE EXCHANGE OF INFORMATION PURSUANT TO ARTICLE 13 OF THE DIRECTIVE 2010/75/EU ON INDUSTRIAL EMISSIONS (IED ARTICLE 13 FORUM)

concerning the Draft Best Available Techniques (BAT) Reference document for the Ferrous Metals Processing Industry

Meeting of 17 December 2021

1. BACKGROUND

Article 13(1) of Directive 2010/75/EU on industrial emissions[1] (the Directive) requires the Commission to organise an exchange of information between Member States, the industries concerned, non-governmental organisations promoting environmental protection and the Commission.

Article 13(3) of the Directive requires the Commission to establish and regularly convene a forum composed of representatives of Member States, the industries concerned and non-governmental organisations promoting environmental protection and to obtain the opinion of the forum on the practical arrangements for the exchange of information foreseen under that Article. In accordance with Article 13(3) of the Directive, the guidance referred to in points (c) and (d) of the second subparagraph of that Article shall take account of the opinion of the forum and shall be adopted in accordance with the regulatory procedure referred to in Article 75(2).

Commission Decision 2011/C 146/03[2] established the forum for the exchange of information pursuant to Article 13 of the Directive (the forum). In accordance with Article 3 of this Decision, the forum may be consulted on any matter relating to Article 13 of the Directive or on any matter relating to BAT as defined in Article 3(10) of the Directive.

2. OPINION OF THE FORUM

In accordance with Article 13(3) of the Directive, the forum hereby gives its opinion on the draft Best Available Techniques (BAT) reference document for the Ferrous Metals Processing Industry as presented at the meeting of the forum of 17 December 2021[3].

[1] OJ L 334, 17.12.2010, p. 17–119, Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control), Text with EEA relevance,

[2] OJ C 146, 17.5.2011, Commission Decision of 16 May 2011 establishing a forum for the exchange of information pursuant to Article 13 of the Directive 2010/75/EU on industrial emissions

[3] https://circabc.europa.eu/ui/group/06f33a94-9829-4eee-b187-21bb783a0fbf/library/6d34f26d-c7f9-4d96-a26f-d3263d8aab16/details

(1) The forum welcomes the draft Best Available Techniques (BAT) reference document for the Ferrous Metals Processing Industry.

(2) The forum acknowledges the discussions held at its meeting of 17 December 2021 and agrees that the changes to the draft Best Available Techniques (BAT) reference document for the Ferrous Metals Processing Industry, as proposed in Annex A, should be included in the final document.

(3) The forum reaffirms the comments in Annex B as representing the views of certain members of the forum but, on which, no consensus exists within the forum to include them in the final document.

Brussels, 13 January 2022

Annex A: Comments on the draft Best Available Techniques (BAT) reference document for the Ferrous Metals Processing Industry that are consensual within the forum.

Annex B: Comments on the draft Best Available Techniques (BAT) reference document for the Ferrous Metals Processing Industry that are representing the view of certain members of the forum.

ANNEX B: COMMENTS ON THE DRAFT BEST AVAILABLE TECHNIQUES (BAT) REFERENCE DOCUMENT FOR THE FERROUS METALS PROCESSING INDUSTRY THAT REPRESENT THE VIEW OF CERTAIN MEMBERS OF THE FORUM

Comment number	Chapter								Page	Comment description	Proposal for modification	Rationale
69	9	10	1						735 (according to pdf page n. 767)	There has been a serious confusion in the evaluation of the techniques for BAT 59 during the Final TWG meetings. The resulting error has been pointed out by EGGA at the final meeting. The 2 specific techniques listed are those for a different objective (zinc removal from normal pickling acid). BAT 59 is not implementable as written and will divert attention from the correct techniques.	In recognition that to delete an entire BAT at this stage and that the objective of the BAT was agreed, it may be possible to generalise the BAT statement to make clear that techniques are available but to delete the two specific techniques listed in BAT 59.	It was discussed during the TWG meetings, and it was also mentioned by various parties in the older sets of comments, that these techniques are not used to recover stripping solution.
70	9	10	1						735	None of the two techniques mentioned in BAT 59 are relevant, this has been mentioned during TWG meetings, as well as it was reported in previous sets of comments.	Keep the BAT, but delete the techniques. Techniques that are applicable should be elaborated and discussed in details during the next document revision.	Applicability of the techniques.
71	9	10	1						735	The error within BAT 59 has been pointed out by EGGA at the final meeting. The specific techniques given fulfil a different objective (ie., zinc removal from pickling acid).	Keep the general BAT statement but delete the two specific techniques listed in BAT 59.	