UK Sector Specific Interpretation Guidance on the Food Drink and Milk Industries (FDM) Best Available Techniques (BAT) Conclusions.

Working draft 19th May 2021.

Contents

Introduction:

This guidance has been produced by the UK Regulators, the Environment Agency (EA), Scottish Environment Protection Agency (SEPA), Natural Resources Wales (NRW) and the Northern Ireland Environment Agency (NIEA) in consultation with industry.

It applies to all installations carrying out activities described in the Food Drink and Milk Industries (FDM) BRef. Its purpose is to ensure consistent UK interpretation and implementation of the FDM BAT conclusions , published in the Official Journal of the European Commission Article on 4 December 2019.

It provides UK interpretation where additional clarification is considered necessary and also references relevant background information from the EIPPCB Technical Working Group which carried out the FDM BRef review.

Where additional guidance is provided for the General Considerations or BAT conclusions, the specific text in the FDM BATc document is reproduced in ***bold italics*** (in full or in part) , followed by the UK interpretation.

This guidance should be read in conjunction with the document entitled “UK Cross-Cutting Interpretation Guidance and Permitting Advice on the Best Available Techniques (BAT) Conclusions published under the Industrial Emissions Directive (IED)”. As the cross-cutting guidance sets out a number of general principles, it is advisable to read this first.

This guidance has been approved by the UK regulators and industry members of the UK shadow Technical Working Group and trade bodies have been consulted. It can be used by the Regulators and provided to operators and other interested parties on request, prior to publication.

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Structure of the FDM BAT conclusions document

The FDM BAT conclusions are presented in Chapter 17 of the FDM BRef and also published in a standalone FDM BAT conclusions (BATc) document. The BATc document is split into the following sections:

- Scope
- Definitions
- General Considerations
- Section 1 General BAT conclusions
- Sections 2-13 Sector specific BAT conclusions

The General BAT conclusions, numbered BAT 1-15 apply to all relevant FDM installations.

The sector specific BAT conclusions, numbered BAT 16-37, apply only where the relevant activity is carried out. In certain cases, BATcs described for one sector may also apply to another sector. Examples include animal feed sector BAT conclusions which are applicable to beet pulp pelletising in sugar processing installations and grain milling BATcs which are applicable to whisk(e)y production.

Scope

This section of the BATc document describes the activities which fall under the FDM BRef and also identifies key exclusions where the FDM BAT conclusions do not apply. For example the FDM BATcs do not apply to activities falling under the Slaughterhouses and Animal By-Product Industries BRef (SA) or to combustion plant covered by the Large Combustion Plant BRef or Medium Combustion Plant Directive.

Clarification is provided on the interface with the SA BRef.

It should be noted that some installations carry out activities which fall under both the FDM and SA BRefs. For example abattoirs may carry out meat processing (an FDM activity) as well as slaughtering (an SA activity). It is up to the Competent Authority (CA) to determine the main activity for the installation as this will then determine the timing of the BATc permit review. In the above example, the United Kingdom CAs consider the slaughtering activity to be the main activity as this is generally associated with the most significant environmental impacts. The sector permit review for such installations will therefore be triggered by publication of the SA BAT conclusions (UK equivalent post-EU departure).

The BATc refers to other BAT conclusions and reference documents which may be relevant including the Waste Treatment (WT) BRef. The EIPPCB Technical Working Group decided that relevant narrative BATcs in the WT BRef for anaerobic digestion (AD) should apply to FDM installations with an AD activity.

Definitions

This section of the BATc document provides a list of definitions for commonly used terms in the BAT conclusions.

Where specific terms are not defined, it is up to each Competent Authority to provide interpretation if required.

The term “waste gases” appears in the FDM BATc document however it is not defined.

In the context of the FDM BATcs it is used only in relation to channelled (ducted) emissions and not, as is the case in wider definitions, diffuse emissions.

The following definition has been produced for the FDM BATcs based on relevant descriptions in the Common Waste Gas Treatment in the Chemicals Sector BRef (WGC).

The term “waste gases” refers to channelled emissions including:

- process emissions released through a vent pipe and integral to the running of the plant;
- flue-gases from combustion units used for direct contact heating or drying;
- waste gases from emission control equipment such as filters, cyclones or incinerators/oxidisers;
- emissions from vents, storage and handling (transfers, loading and unloading) of products, raw materials and intermediates;
- discharges from safety relief devices (e.g. safety vents, safety valves);
- exhaust air from general ventilation or extraction systems;

General Considerations

Additional UK clarification is provided on the following topics:

1. Best Available Techniques	Explanation of descriptive (narrative) BAT.
2. BAT-AELs for emissions to water	Explanation of when BAT-AELs apply and effluent sampling requirements. Explanation of how average abatement efficiency is calculated.

1. Best Available Techniques: Descriptive (narrative) BAT.

The FDM BATc document states that:

Best Available Techniques

The techniques listed and described in these BAT conclusions are neither prescriptive nor exhaustive. Other techniques may be used that ensure at least an equivalent level of environmental protection.

Unless otherwise stated, the BAT conclusions are generally applicable.

UK Interpretation

This statement should be self-explanatory. It applies to descriptive (narrative) BAT i.e. techniques without any associated numerical values. Refer to the UK Cross Cutting guidance for further details.

2. **BAT-AELs for emissions to water.**

The FDM BATc document states that:

"Emission levels associated with the best available techniques (BAT-AELs) for emissions to water

The BAT-AELs expressed as concentrations refer to daily average values, i.e. 24-hour flow-proportional composite samples. Time-proportional composite samples can be used provided that sufficient flow stability is demonstrated. Alternatively, spot samples may be taken, provided that the effluent is appropriately mixed and homogeneous.

In the case of total organic carbon (TOC), chemical oxygen demand (COD), total nitrogen (TN) and total phosphorus (TP), the calculation of the average abatement efficiency referred to in these BAT conclusions (see Table 1) is based on the influent and effluent load of the waste water treatment plant."

UK Interpretation

As stated in BAT 12, the BAT-AELs for emissions to water apply only to direct discharges. This includes discharges to surface water sewers where there is no subsequent off-site treatment.

Some installations have a direct discharge to groundwater, typically via some form of a soakaway. If the BAT-AELs have been derived solely using data for direct discharges to surface waters, as in the case of the FDM BRef, then it is not appropriate to use them for direct discharges to groundwater.

Refer to cross-cutting guidance for the approach on setting emission limit values for indirect discharges to sewer and for site specific Groundwater assessments for soakaway discharges.

There is a clear hierarchy for final effluent sampling:

i) 24-hour flow proportional composite samples (with refrigeration).
ii) Time-proportional composite samples may be acceptable if the flow characteristics are sufficiently stable.
iii) Otherwise spot sampling may be acceptable if both of the following apply:
    a) It can be demonstrated that the effluent is mixed and homogenous and
    b) It is not practical to install a composite sampler due to the remote location of the sampling point.

Average abatement efficiency is based on a yearly average and calculated on a flow weighted basis (refer to UK Cross Cutting guidance for further detail).

General BAT Conclusions

The General BAT conclusions, numbered BAT 1-15 in section 1 apply to all FDM installations.

Additional UK clarification is provided on the following BAT conclusions:

BAT 2	Resource efficiency
BAT 3	Key process parameters for wastewater treatment
BAT 4	Monitoring for emissions to water
BAT 5	Monitoring for emissions to air – footnotes (1) and (3)
BAT 6	Energy efficiency
BAT 7	Water consumption

BAT 8	Harmful substances
BAT 9	F-Gas refrigerants
BAT 11	Uncontrolled emissions to water
BAT 12	BAT-AELs for emissions to water

1. BAT 2 Resource efficiency

The FDM BATc document states that:

"BAT 2. In order to increase resource efficiency and to reduce emissions, BAT is to establish, maintain and regularly review (including when a significant change occurs) an inventory of water, energy and raw materials consumption as well as of waste water and waste gas streams, as part of the environmental management system (see BAT 1), that incorporates all of the following features:
I. Information about the food, drink and milk production processes, including:
(a) simplified process flow sheets that show the origin of the emissions;
(b) descriptions of process-integrated techniques and waste water/waste gas treatment techniques to prevent or reduce emissions, including their performance.

II. Information about water consumption and usage (e.g. flow diagrams and water mass balances), and identification of actions to reduce water consumption and waste water volume (see BAT 7).

III. Information about the quantity and characteristics of the waste water streams, such as:

(a) average values and variability of flow, pH and temperature;
(b) average concentration and load values of relevant pollutants/parameters (e.g. TOC or COD, nitrogen species, phosphorus, chloride, conductivity) and their variability.

IV. Information about the characteristics of the waste gas streams, such as:

(a) average values and variability of flow and temperature;
(b) average concentration and load values of relevant pollutants/parameters (e.g. dust, TVOC, CO, NO_x, SO_x) and their variability;
(c) presence of other substances that may affect the waste gas treatment system or plant safety (e.g. oxygen, water vapour, dust).

V. Information about energy consumption and usage, the quantity of raw materials used, as well as the quantity and characteristics of residues generated, and identification of actions for continuous improvement of resource efficiency (see for example BAT 6 and BAT 10).

VI. Identification and implementation of an appropriate monitoring strategy with the aim of increasing resource efficiency, taking into account energy, water and raw materials consumption. Monitoring can include direct measurements, calculations or recording with an appropriate frequency. The monitoring is broken down at the most appropriate level (e.g. at process or plant/installation level).

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

UK interpretation

Although not compulsory, an externally accredited Environmental Management System would contain the required level of information to demonstrate compliance with this BATc.

Compliance with the aspects relating to raw materials consumption/waste minimisation may also be demonstrated by participation in the Waste and Resources Action Programme (WRAP) Target Measure Act initiative. Otherwise operators will be expected to maintain an inventory with all required information as set out above.

Requirement V "Information about energy consumption…" is intended to promote sub-metering for significant energy and water usage. For existing installations without such sub-metering, the operator is expected to investigate the feasibility of retro-fitting meters and where deemed appropriate, their installation.

New installations are expected to install appropriate sub-metering for energy and water consumption.

2. BAT 3 Key process parameters for wastewater treatment

The FDM BATc document states that:

"BAT 3. For relevant emissions to water as identified by the inventory of waste water streams (see BAT 2), BAT is to monitor key process parameters (e.g. continuous monitoring of waste water flow, pH and temperature) at key locations (e.g. at the inlet and/or outlet of the pre-treatment, at the inlet to the final treatment, at the point where the emission leaves the installation)."

UK interpretation

This BATc applies to all on-site effluent treatment plants (ETPs) and direct discharges of effluent to watercourses, soakaway/groundwater or to sewer. Its purpose is to ensure that operators have appropriate monitoring of process parameters in place for effective management of ETPs and direct discharges.

It is expected that operators will design and implement a monitoring programme for all key process parameters as specified by competent personnel (e.g. ETP supplier, contractor or consultant etc). This programme will take into account the nature of the treatment processes and effluent characteristics. The objective is to provide timely data to aid effective management of the ETP, perform trend analysis and anticipate issues that may affect plant performance.

Monitoring requirements for process parameters will be dependent on the nature of treatment etc.

Operators should provide a justification for the monitoring regime they have in place.

The minimum expected requirements for an on-site ETP comprising primary treatment and secondary aerobic biological treatment and discharging directly to a watercourse are as follows:

Parameter	Location	Monitoring method
Flow, temperature and pH	Influent Between primary and secondary treatment Final effluent	Continuous and linked to SCADA system or similar
Dissolved Oxygen Mixed Liquor Suspended Solids (MLSS) Temperature	Activated sludge tank	In-line probe(s) linked to SCADA system or similar
Sludge microscopy	Activated sludge tank	Weekly laboratory analysis
Chemical Oxygen Demand Total Suspended Solids	Influent Between primary and secondary treatment Final effluent	Daily 24-hour composite flow proportional sampler
Loading to the biological plant (kgCOD/day)	Activated sludge tank	By calculation using monitoring data
Activated sludge loading rate (kgCOD/kgMLSS/d)	Activated sludge tank	By calculation using monitoring data
Stirred Sludge Volume Index (SSVI)	Activated sludge tank	Laboratory testing and calculation

3. BAT 4 Monitoring emissions to water

The FDM BATc document states that:

"BAT 4. BAT is to monitor emissions to water with at least the frequency given below and in accordance with EN standards. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.

Substance/parameter	*Standard(s)*	*Minimum monitoring frequency [1]*	*Monitoring associated with*
Chemical oxygen demand (COD) [2] [3]	***No EN standard available***	***Once every day [4]***	***BAT 12***
Once every day [4] BAT 12 Total nitrogen (TN) [2]	***Various EN standards available (e.g. EN 12260, EN ISO 11905-1)***		
Total organic carbon (TOC) [2] [3]	***EN 1484***		
Total phosphorus (TP) [2]	***Various EN standards available (e.g. EN ISO 6878, EN ISO 15681-1 and -2, EN ISO 11885)***		

Total suspended solids (TSS) [(2)]	***EN 872***		
Biochemical oxygen demand (BODn) [(2)]	***EN 1899-1***	***Once every month***	
Chloride (Cl-)	***Various EN standards available (e.g. EN ISO 10304-1, EN ISO 15682)***	***Once every month***	***—***

(1) The monitoring only applies when the substance concerned is identified as relevant in the waste water stream based on the inventory mentioned in BAT 2.

(2) The monitoring only applies in the case of a direct discharge to a receiving water body.

(3) TOC monitoring and COD monitoring are alternatives. TOC monitoring is the preferred option because it does not rely on the use of very toxic compounds.

(4) If the emission levels are proven to be sufficiently stable, a lower monitoring frequency can be adopted but in any case at least once every month."

UK interpretation

Footnote (1)

This footnote explains how monitoring requirements for individual substances/parameters should be determined and in most cases this should be straightforward.

The number of relevant substances/parameters which require monitoring will vary depending on the characteristics of the effluent produced. BAT 2 requires the operator to characterise the composition of their effluent and thus identify relevant substances/parameters.

Further detail is provided below for chloride monitoring.

Initially the BRef review identified chloride as a Key Environmental Issue for cheese manufacture and fish/shellfish processing as they involve a brining stage which may result in significant quantities of chloride being present in wastewater.

It was noted later that chloride monitoring may also be relevant for other activities eg curing of certain meats and sauerkraut manufacture.

The presumption is that chloride monitoring will be required for cheese manufacture and fish/shellfish processing unless the operator is able to justify otherwise on a site specific basis.

Chloride monitoring may be required elsewhere depending on the waste water assessment required under BAT 2. This should include where chloride is present in ancillary chemicals. Some judgement will be required here. It is unlikely that occasional or trace additions of chlorides eg use as an ingredient for preservatives or in regeneration of base exchange water softeners will require chloride monitoring however excessive use of ferric chloride as an effluent treatment chemical may be more significant, especially for direct emissions.

Footnote (2)

Chloride is the only substance/parameter in this table where Footnote 2 does not apply. This means that where chloride has been identified as a relevant substance, the monitoring requirement will apply for both direct and indirect (sewer) emissions. The reason for this is that chloride is viewed as a persistent substance which would not normally be removed by off-site wastewater treatment.

Footnote (3)

The EIPPCB has a stated ambition to set BAT-AELs for TOC instead of COD due to the presence of toxic reagents in the standard COD test eg dichromate and mercury. This ambition applies to all BRefs not just FDM.

Notwithstanding this ambition, there are a number of reasons to derive a BAT-AEL based on COD including:

- Very few sites carry out TOC analysis and so there is insufficient available data to derive robust BAT-AELs whereas COD is a common parameter and data is generally available.
- Some sectors including dairy reported increased interference of TOC testing due to presence of fats in effluent.
- Increased availability of low toxicity COD test kits.

The UK approach is that the COD BAT-AEL will normally be used unless an operator requests otherwise. If so, they will be required to produce a site specific assessment to satisfactorily demonstrate the relationship between COD and TOC for that particular effluent.

4. BAT 5 Monitoring for emissions to air

The FDM BATc document states that:

"BAT 5. BAT is to monitor channelled emissions to air with at least the frequency given below and in accordance with EN standards.

Substance/parameter	*Sector*	*Specific process*	*Standard(s)*	*Minimum monitoring frequency (1)*	*Monitoring associated with*
Dust	*Animal feed*	*Drying of green fodder*	*EN 13284-1*	*Once every three months (2)*	*BAT 17*
		Grinding and pellet cooling in compound feed manufacture		*Once every year*	*BAT 17*
		Extrusion of dry pet food		*Once every year*	*BAT 17*
	Brewing	*Handling and processing*		*Once every year*	*BAT 20*

Substance/parameter	*Sector*	*Specific process*	*Standard(s)*	*Minimum monitoring frequency* (1)	*Monitoring associated with*
		of malt and adjuncts			
	Dairies	*Drying processes*		*Once every year*	*BAT 23*
	Grain milling	*Grain cleaning and milling*		*Once every year*	*BAT 28*
	Oilseed processing and vegetable oil refining	*Handling and preparation of seeds, drying and cooling of meal*		*Once every year*	*BAT 31*
	Starch production	*Drying of starch, protein and fibre*		*Once every year*	*BAT 34*
	Sugar manufacturing	*Drying of beet pulp*		*Once every month* (2)	*BAT 36*
PM2.5 and PM10	*Sugar manufacturing*	*Drying of beet pulp*	*EN ISO 23210*	*Once every year*	*BAT 36*
TVOC	*Fish and shellfish processing*	*Smoke chambers*	*EN 12619*	*Once every year*	*BAT 26*
	Meat processing	*Smoke chambers*			*BAT 29*
	Oilseed processing and vegetable oil refining (3)	*—*			*—*
	Sugar manufacturing	*High-temperature drying of beet pulp*		*Once every year*	*—*
NOX	*Meat processing* (4)	*Smoke chambers*	*EN 14792*	*Once every year*	*—*
	Sugar manufacturing	*High-temperature drying of beet pulp*			
CO	*Meat processing* (4)	*Smoke chambers*	*EN 15058*		
	Sugar manufacturing	*High-temperature drying of beet pulp*			

Substance/parameter	*Sector*	*Specific process*	*Standard(s)*	*Minimum monitoring frequency* *(1)*	*Monitoring associated with*
SOX	*Sugar manufacturing*	*Drying of beet pulp when natural gas is not used*	*EN 14791*	*Twice every year* *(2)*	*BAT 37*

(1) The measurements are carried out at the highest expected emission state under normal operating conditions.

(2) If the emission levels are proven to be sufficiently stable, a lower monitoring frequency can be adopted but in any case at least once every year.

(3) The measurement is carried out during a campaign of two days.

(4) The monitoring only applies when a thermal oxidiser is used.

UK interpretation

Footnote (1)

Further guidance on monitoring in normal operating conditions is provided in the JRC Reference Report on Monitoring of Emissions to Air and Water from IED Installations (ROM). Refer to section 3.5 of the ROM.

Footnote (3)

This footnote applies to TVOC monitoring at oilseed processing and vegetable oil refining installations. Its purpose is to require operators to undertake an annual intensive monitoring exercise to quantify TVOC emissions, principally hexane, from all stages of the process including meal cooling. The two day monitoring period reflects the batch nature of the process and number of emission points.

5. BAT 6 Energy efficiency

The FDM BATc document states that:

BAT 6. In order to increase energy efficiency, BAT is to use BAT 6a and an appropriate combination of the common techniques listed in technique b below.

Technique		*Description*
(a)	*Energy efficiency plan*	*An energy efficiency plan, as part of the environmental management system (see BAT 1), entails defining and calculating the specific energy consumption of the activity (or activities), setting key performance indicators on an annual basis (for example for the specific energy consumption) and planning periodic improvement targets*

		and related actions. The plan is adapted to the specificities of the installation.
(b)	***Use of common techniques***	***Common techniques include techniques such as:*** ***— burner regulation and control;*** ***— cogeneration;*** ***— energy-efficient motors;*** ***— heat recovery with heat exchangers and/or heat pumps (including mechanical vapour recompression);*** ***— lighting;*** ***— minimising blowdown from the boiler;*** ***— optimising steam distribution systems;*** ***— preheating feed water (including the use of economisers);*** ***— process control systems;*** ***— reducing compressed air system leaks;*** ***— reducing heat losses by insulation;*** ***— variable speed drives;*** ***— multiple-effect evaporation;*** ***— use of solar energy.***

UK interpretation

Although not compulsory, certification to ISO 50001 Energy Management would demonstrate compliance with this BATc.

6. BAT 7 Water consumption and waste water discharge

The FDM BATc document states that:

"BAT 7. In order to reduce water consumption and the volume of waste water discharged, BAT is to use BAT 7a and one or a combination of the techniques b to k given below….."

h	***Optimisation of chemical dosing and water use in cleaning-in-place (CIP)***	***Optimising the design of CIP and measuring turbidity, conductivity, temperature and/or pH to dose hot water and chemicals in optimised quantities***	***Generally applicable***

UK interpretation

BAT technique h: Operators should be able to demonstrate that where CIP systems are used, a system optimisation check has been carried out, including assessment of rinse times and minimisation of product losses, to ensure efficient use of water, avoidance of "over-cleaning" and minimisation of effluent loading.

7. BAT 8 Harmful substances

The FDM BATc document states that:

"BAT 8. In order to prevent or reduce the use of harmful substances, e.g. in cleaning and disinfection, BAT is to use one or a combination of the techniques given below…..."

Technique		*Description*
a	***Proper selection of cleaning chemicals and/or disinfectants***	***Avoidance or minimisation of the use of cleaning chemicals and/or disinfectants that are harmful to the aquatic environment, in particular priority substances considered under the Water Framework Directive 2000/60/EC of the European Parliament and of the Council4. When selecting the substances, hygiene and food safety requirements are taken into account.***
b	***Reuse of cleaning chemicals in cleaning-in-place (CIP)***	***Collection and reuse of cleaning chemicals in CIP. When reusing cleaning chemicals, hygiene and food safety requirements are taken into account.***
c	***Dry cleaning***	***See BAT 7e.***
d	***Optimised design and construction of equipment and process areas***	***See BAT 7j.***

UK interpretation

This BATc applies principally, but not exclusively, to substances identified in the Water Framework Directive (2000/60/EC) which may be present in wastewater in sufficient quantities to be of concern. It is not intended to apply to trace quantities of mercury or cadmium in caustic/acid based cleaning agents. Use of mercury cells in the production of caustic has been phased out under the Chlor-alkali BRef and remaining supply chain stocks of caustic produced by this method will soon be exhausted.

BAT technique a: Triclosan is a chlorinated diphenyl ether which falls under Annex VIII of the Water Framework Directive. It is used as an anti-bacterial agent in a range of consumer products, some of which are used in the food and drink sector as hand cleaners etc. It is not readily degradable so it may persist through wastewater treatment processes and be released into the aquatic environment. Consideration should be given to eliminating its use by substitution with suitable alternatives.

BAT technique b: Operators should be able to demonstrate that a CIP system optimisation check has been carried out, including chemical dosing and recovery, to ensure efficient use of cleaning chemicals.

8. BAT 9 F-Gas refrigerants

The FDM BATc document states that:

"BAT 9. In order to prevent emissions of ozone-depleting substances and of substances with a high global warming potential from cooling and freezing, BAT is to use refrigerants without ozone depletion potential and with a low global warming potential

Description
Suitable refrigerants include water, carbon dioxide or ammonia."

UK interpretation

This BATc is intended to complement the F-Gas Regulations and related international agreement (Kigali amendment to Montreal Protocol) in promoting the phasedown of higher global warming potential (GWP) refrigerants. It does not affect any statutory requirement under the F-Gas Regulations and operators should ensure they understand their obligations under this legislation.

The FDM BREF does not define "low global warming potential" and the UK has taken this to mean "*lower* global warming potential". This interpretation allows for a two stage approach for existing refrigeration systems that is entirely consistent with the objectives of current F-Gas legislation.

Stage 1. Consideration of short term improvement opportunities in the permitted installation.

Where high GWP refrigerants are used e.g. R404A (GWP 3922), operators should consider replacement with "retrofillable" alternatives with a lower GWP. For example R448A and R449A (GWP ~ 1400) are suitable alternatives to R404A and replacement would result in ~50% GWP reduction. Such non-capital improvements may be achieved within relatively short timescales.

Stage 2. End of life system replacement.

Operators should provide proposals on how they will move to refrigerants with the lowest practical GWP. Wherever possible ultra low GWP refrigerants (such as ammonia, carbon dioxide, pure Hydrofluoroolefins (HFOs) etc) should be selected upon replacement of existing systems. For some types of system, especially small and medium sized cooling systems, an ultra-low refrigerant might not be cost effective and lower GWP alternatives with GWPs in the 10 to 750 range can also be considered. Replacement systems should never require the old high GWP HFCs (like R-404A, R-410A, R-134a) except in exceptional circumstances.

Overall energy efficiency should be taken into account when considering alternative refrigerants as indirect carbon dioxide emissions from energy consumption are much greater than direct emissions associated with refrigerant losses.

It is expected that all new refrigeration systems will use refrigerants with the lowest practical GWP. As with end of life system replacements, ultra low GWP refrigerants should be used wherever possible.

The European Commission has published information on climate friendly alternatives to HFCs which may provide helpful references.

This BATc also addresses refrigerants with ozone depleting potential. There is anecdotal information to indicate that some small scale systems using R22 are still in use. As such systems cannot be lawfully topped there is a presumption that they are being "operated to failure". Under this BATc operators will be required to identify all systems using R22 and propose suitable replacement.

Summary:

i) Operator to provide details on F-Gas inventory (type and system capacity).
ii) Where appropriate, operator to identify options for drop-in replacement.
iii) Operator to make initial proposals for end of life replacement of high GWP systems.

9. BAT 11 Uncontrolled emissions to water

The FDM BATc document states that:

BAT 11. In order to prevent uncontrolled emissions to water, BAT is to provide an appropriate buffer storage capacity for waste water.

Description

The appropriate buffer storage capacity is determined by a risk assessment (taking into account the nature of the pollutant(s), the effects of these pollutants on further waste water treatment, the receiving environment, etc.). The waste water from this buffer storage is discharged after appropriate measures are taken (e.g. monitoring, treatment, reuse).

Applicability

For existing plants, the technique may not be applicable due to lack of space and/or due to the layout of the waste water collection system.

UK interpretation

This BATc applies to discharges to water, soakaway and sewer. It is intended to ensure measures are in place to detect uncontrolled releases into drainage systems (from spills etc) and to prevent their discharge off site. The scope of the risk assessment should include aspects such as in-line monitoring, emergency storage tanks, slam-shut valves etc.

10. BAT 12 BAT-AELs for emissions to water

The FDM BATc document states that:

Table 1 BAT-associated emission levels (BAT-AELs) for direct emissions to a receiving water body

Parameter	*BAT-AEL (1) (2) (daily average)*
Chemical oxygen demand (COD) (3) (4)	*25-100 mg/l (5)*
Total suspended solids (TSS)	*4-50 mg/l (6)*
Total nitrogen (TN)	*2-20 mg/l (7) (8)*
Total phosphorus (TP)	*0,2-2 mg/l (9)*

(1) The BAT-AELs do not apply to emissions from grain milling, green fodder processing, and the production of dry pet food and compound feed.

(2) The BAT-AELs may not apply to the production of citric acid or yeast.

(3) No BAT-AEL applies for biochemical oxygen demand (BOD). As an indication, the yearly average BOD_5 level in the effluent from a biological waste water treatment plant will generally be ≤ 20 mg/l.

(4) The BAT-AEL for COD may be replaced by a BAT-AEL for TOC. The correlation between COD and TOC is determined on a case-by-case basis. The BAT-AEL for TOC is the preferred option because TOC monitoring does not rely on the use of very toxic compounds.

(5) The upper end of the range is:

— 125 mg/l for dairies;

— 120 mg/l for fruit and vegetable installations;

— 200 mg/l for oilseed processing and vegetable oil refining installations;

— 185 mg/l for starch production installations;

— 155 mg/l for sugar manufacturing installations;

as daily averages only if the abatement efficiency is ≥ 95 % as a yearly average or as an average over the production period.

(6) The lower end of the range is typically achieved when using filtration (e.g. sand filtration, microfiltration, membrane bioreactor), while the upper end of the range is typically achieved when using sedimentation only.

(7) The upper end of the range is 30 mg/l as a daily average only if the abatement efficiency is ≥ 80 % as a yearly average or as an average over the production period.

(8) The BAT-AEL may not apply when the temperature of the waste water is low (e.g. below 12 °C) for prolonged periods.

(9) The upper end of the range is:

— 4 mg/l for dairies and starch installations producing modified and/or hydrolysed starch;

— 5 mg/l for fruit and vegetable installations;

— 10 mg/l for oilseed processing and vegetable oil refining installations carrying out soap-stock splitting;

as daily averages only if the abatement efficiency is ≥ 95 % as a yearly average or as an average over the production period.

UK interpretation

In footnotes (5) and (9) the references to "abatement efficiency as a yearly average…." are taken to be removal efficiency as calculated on a flow weighted basis (refer to IED Cross Cutting guidance for further detail).

Footnote (8), this reference to prolonged periods of low temperature was specifically inserted to take account of extended winter conditions experienced in the Baltic States. It would only apply in the UK in exceptional circumstances where the Met Office has issued a Level 3 Cold Weather alert for that location i.e. the mean temperature has fallen below 2 degrees C for 48 hours or longer.

Sector specific BAT conclusions

The sector specific BAT conclusions, numbered BAT 16-37, apply only where the relevant activity is carried out. In certain cases, BATcs described for one sector may also apply to another sector. Examples include animal feed sector BAT conclusions which are applicable to beet pulp pelletising in sugar processing installations and grain milling BATcs which are applicable to whisk(e)y production.

Additional UK clarification is provided on the following BAT conclusions:

BAT 18 - 20	BAT conclusions for Brewing BATcs and applicability to cider production
BAT 24	BAT conclusions for ethanol production

1. BAT conclusions for Brewing BATcs and applicability to cider production BAT 18-20

It is implicit that all BATcs in this section are applicable to brewing of beer, however the following BATcs are also applicable to cider production:

i) Table 5 Indicative environmental performance level for specific energy consumption
ii) Table 6 Indicative environmental performance level for specific waste water discharge
iii) BAT 19 Techniques to reduce the quantity of waste sent for disposal

2. BAT conclusions for ethanol production

This section including BAT 24 refers to ethanol distillation which is integrated with other FDM activities, namely sugar and starch processing and is not applicable to whisk(e)y production.