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ENVIRONMENTAL NOISE IMPACT ASSESSMENT REPORT

BALLYFASKIN ENTERPRISES LTD
BALLYFASKIN, BALLYLANDERS,
CO. LIMERICK

2020

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1.0 INTRODUCTION & SCOPE OF REPORT

Ballyfaskin Enterprises Ltd, whom operate a pig rearing facility at Ballyfaskin, Ballylanders, Co. Limerick, are seeking permission (Planning Ref:191135) from Limerick Co Co to increase the capacity of the piggery from 600 sows to 1000 sows and their progeny and the construction of a new electrical substation.

The farm was originally designed for the finishing of pigs at 130kgs, with an allowance of 1.1 M^2 of floor space per pig in accordance with Bord Bia specifications. The market has now shifted to a demand for pigs finished to a weight of between 100 to 110 kgs. Bord Bia specifications require an allowance of 0.65 M^2 per pig at these weights. Therefore, the capacity for the increase in pig numbers is already in place at the site and no additional development would be required.

The only construction which would occur would be a new electrical substation, which would be constructed to ESB / best practice standards.

Ballyfaskin Enterprises Ltd received the following request for further information:

Noise
A noise assessment should be carried out in accordance with BS 4142:2014 Methods for rating and assessing industrial and commercial sound to establish the potential impact on the nearest noise sensitive properties from the electric substation, as well as the potential impact due to increased noise levels from the development related to increase numbers of animals in the existing buildings, traffic movement and associated machinery…The baseline noise assessment should be carried out not taking into account the existing development.

A map of the site, site boundary, surrounding noise sensitive receptors and monitoring locations is provided in Appendix A.

This Noise Impact Assessment included:

1. Description of noise and the noise meter to be used.
2. Details and maps of the locations for noise monitoring stations.
3. Detailing the noise measurements obtained.
4. Calibration certificates for all noise monitoring equipment.
5. Determine the baseline noise levels at the closest sensitive receptors.
6. Predict the impact of the current operations and proposed new operations and construction on the closest noise sensitive receptors.
7. Discussion & Recommendations.

The survey was undertaken in accordance with the methodology specified in the '*BS4142:2014 – Method for Rating Industrial Noise Affecting Mixed Residential and Industrial Areas'* as published by The British Standards Institution in 2014.

The report also presents and interprets the results of the survey with reference to the 2016 EPA '*Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)'.*

2.0 LEGISLATION AND GUIDANCE

Planning and Development Act (2000), as amended

Local authorities are responsible for the planning and environmental regulation of any proposed developments. The current planning and environmental regulatory framework requires these developments to comply with the Planning and Development Act (2000) and related regulations.

The local authorities and An Bord Pleanala attach conditions relating to environmental management of these developments to planning permissions granted. Local authorities consider the land use and planning issues associated with the proposed developments in their County Development Plans.

The EPA Act (Noise) Regulations 1994 (S.I. No. 179 of 1994)

The relevant part of the Environmental Protection Agency Act 1992 dealing with noise is Part VI, Sections 106 to 108. These Sections deal with the control of noise, the power of local authorities to prevent or limit noise and the issue of noise as a nuisance.

The 1994 Regulations came into effect in July 1994 and outline the procedures for dealing with noise nuisance. The Regulations allow affected individuals, local authorities or the EPA to take action against an activity causing a noise nuisance.

These Regulations replaced the procedures for noise complaints contained in the Local Government (Planning & Development) Act 1963. Companies must show that reasonable care was taken to prevent or limit the noise from their activities.

If the courts decide that a company is responsible for causing a noise nuisance, they can order the company to take measures to reduce, prevent or limit it.

Ballyfaskin Enterprises Ltd EPA IE Licence (Ref: P0915-01)

The farm to which this application applies operates under a licence issued by the EPA. Ballyfaskin Enterprises Ltd received an IPPC licence on the 10th June 2013. This licence was amended on the 16th December 2013.

Condition 4.1 and Schedule B.4 of the sites licence establish noise limits to which the site must comply, as follows:

Condition 4.1 Noise
Noise from the installation shall not give rise to sound pressure levels $L_{Aeq,\ T}$) measured at the noise sensitive locations of the installation which exceed the limit value(s).

Schedule B.4 Noise Emission Limits

Daytime dB $L_{Ar,T}$ (30 minutes)	Daytime dB $L_{Ar,T}$ (30 minutes)	Daytime dB $L_{Aeq,T}$ (15-30 minutes)
55	50	45

Note 1: There shall be no clearly audible tonal component or impulsive component in the noise emission from the activity at any noise- sensitive location.

EPA (NG4) 'Guidance Note on Noise' (2016)

The document relates primarily to noise surveys and assessments for EPA licensed facilities but in the absence of any other directly applicable guidance documents, it also is pertinent for the purposes of noise surveys and assessments accompanying planning applications.

It deals in general terms with the approach to be taken in the measurement and control of noise, and provides advice in relation to the settling of noise ELV's and compliance monitoring. In line with World Health Organisation (WHO) guidance, it recommends that the following noise levels not be exceeded at the facades of the nearest noise-sensitive receptors:

Table 2.1: EPA (NG4) Recommended Noise Limits

Period	Times	Standard dB(A)	Low Background Noise Area dB(A)
Day	(07:00 to 19:00hrs)	55dB $L_{Ar,T}$	45dB $L_{Ar,T}$
Evening	(19:00 to 23:00hrs)	50dB $L_{Ar,T}$	40dB $L_{Ar,T}$
Night	(23:00 to 07:00hrs)	45dB $L_{Aeq,T}$	35dB $L_{Ar,T}$

Other EPA general EIA guidelines such as Guidelines on the Information to be Contained in Environmental Impact Statements [2002] and Advice Notes on Current Practice (in the Preparation of Environmental Impact Statements) [2003] have been considered in the preparation of this Noise and Vibration Chapter.

World Health Organisation Document 'Guidelines for Community Noise'

The World Health Organisation (WHO) published the document '*Guidelines for Community Noise'* in 1999/2000. This states that general outdoor noise levels of below 50dB LAeq during the day are desirable to prevent 'moderate' community annoyance. The guidance also recommends the LAeq should not exceed 30dB indoors if negative effects on sleep are to be avoided.

The World Health Organisation (WHO) published an extension document *'Environmental Noise Directive 2002/49/EC – Night Noise Guidelines for Europe'* in 2002. This states that outdoor noise levels should not exceed 40dB LAeq during the night to protect the public, including the most vulnerable groups such as children, the chronically ill and the elderly.

The World Health Organisation proposed *Guidelines for Community Noise* details that, if the daytime and evening LAeq for general steady, continuous noise in an outdoor living area exceeds 55 dB, then there is likely to be serious annoyance. If this value drops to 50 dB, then the annoyance factor becomes moderate. The guidelines also considered noise levels at which sleep disturbance would not take place. The guidelines suggest that an internal LAeq, 8hr not greater than 30 dB for continuous noise is needed to prevent negative effects on sleep. This is equivalent to a façade level of 45 dB LAeq, assuming open windows, or a free-field level of approximately 42 dB LAeq.

BS 4142:2014

The British Standard EN BS 4142 '*Method for Rating Industrial Noise Affecting Mixed Residential and Industrial Areas*' provides a method for predicting the likelihood of impact from noisy activities such as industrial activities, quarries and landfills etc.

British Standard 4142:2014 Methods for rating and assessing industrial and commercial sound describes methods for rating and assessing sound of an industrial and/or commercial nature, which includes:

a) sound from industrial and manufacturing processes;
b) sound from fixed installations which comprise mechanical and electrical plant and equipment;
c) sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and
d) sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train or ship movements on or around an industrial and/or commercial site.

This standard is applicable to the determination of the following levels at outdoor locations:

a) rating levels for sources of sound of an industrial and/or commercial nature; and
b) ambient, background and residual sound levels, for the purposes of:
    1) investigating complaints;
    2) assessing sound from proposed, new, modified or additional source(s) of sound of an industrial and/or commercial nature; and
    3) assessing sound at proposed new dwellings or premises used for residential purposes.

BS4142 defines the following terms for describing existing and future noise levels:

Ambient Sound Level, La = $L_{Aeq,T}$
Equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time, usually composed of sound from many sources near and far, at the assessment location over a given time interval, T.

Specific Sound Level, Ls = $L_{Aeq,Tr}$
Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given time interval, Tr.

Residual Sound Level, Lr = $L_{Aeq,T}$
Equivalent continuous A-weighted sound pressure level of the residual sound at the assessment location over a given time interval, T.

Background Noise Level, $L_{A90,T}$
A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels.

Rating Level, $L_{Ar,Tr}$
Specific sound level plus any adjustment for the characteristic features of the sound.

The standard states that, when possible, the background sound level should be measured at the assessment location. It should be ensured that the measurement time interval is of sufficient duration to obtain a representative value of the background sound level.

BS4142 notes that where it is not possible to determine the specific sound level directly by measurement, it may be appropriate to determine the specific sound level by a combination of measurement and calculation.

Certain acoustic features can increase the significance of impact over the basic comparison between the specific sound level and the background sound level.

Subjectively and where appropriate, such as for instances where a new, proposed sound cannot be measured, the specific sound level should be corrected if a tonal or impulsive characteristic is expected to be present.

A correction factor, typically of up to +6dB for tonal elements and up to +9dB for impulsive elements, may be applied arithmetically to the predicted noise from the proposed activity based upon the character of the noise, audibility and its likelihood to cause nuisance. This is termed the 'rating level'.

If the rating level exceeds the background L_{90} by 10 dBA or more, this is likely to be an indication of a significant adverse impact. A positive difference of around 5 dBA could be an indication of a significant adverse impact, depending on the context. The lower the rating level is relative to the measured background sound level, the less likely it is that there will be an adverse impact.

Table 2.2: BS 4142:2014 Tonal and Impulse Noise Penalties	
Tonality	**Impulsivity**
Just perceptible, apply a penalty of 2dB	Just perceptible, apply a penalty of 3dB
Clearly perceptible, apply a penalty of 4dB	Clearly perceptible, apply a penalty of 6dB
Highly perceptible, apply a penalty of 6dB	Highly perceptible, apply a penalty of 9dB

For other sound characteristics which are not tonal or impulsive but readily distinguishable, a penalty of 3dB can be applied.

Where a specific sound is intermittent and readily distinctive, a penalty of 3dB can be applied. If the subjective method is not sufficient for assessing the audibility or prominence of tones or impulsive sounds, identification can be made using the one-third octave method.

When making an assessment on the impact of a specific sound, an initial estimation is made by subtracting the measured background sound level from the rating level. Typically, the greater the difference, the greater the magnitude of impact:

- A difference of around +10dB or more is likely to be an indication of a significant adverse impact.
- A difference of around +5dB is likely to be an indication of an adverse impact.
- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact.
- Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact.

3.0 MEASUREMENT PARAMETERS

The parameters used to assess noise are as follows:

L_{eq}, T: The L_{AF} noise values recorded continuously at every instant during a given sampling period (T) are integrated by the noise metre to give a single value that represents the continuous equivalent sound level over the given period during this survey.

L_{10} and L_{90}: are both statistical noise levels. L_{10} indicates that for 10% of the monitoring period the sound levels were greater than the quoted value. L_{90} indicates that for 90% of the monitoring period, the sound levels were greater than the quoted value. L_{10} is used to express event noise. L_{90} is used to express background noise, usually filtering out load, and intermittent interferences such as traffic noise.

Continuous: noise produced without interruption.

Intermittent: noise that is punctuated with interruptions e.g. equipment operating in cycles or events such as single passing vehicle or aircraft.

Impulsive: a noise of short duration (typically less than one second), the sound pressure of which is significantly higher than the background; brief and abrupt.

Tonal: noise that contains a clearly audible tone i.e. a distinguishable, discrete or continuous note (whine, hiss, hum or screech etc.).

In order for a tone or impulsive element to warrant a penalty, it should be clearly noticeable and audible. Situations in which a penalty applies include the following:

- The noise contains a distinguishable, discrete continuous note (whine, hiss, screech, hum etc.).
- The noise contains distinct impulses (bangs, clicks, clatters, or thumps).
- The noise is irregular enough to attract attention.
- The tonal components are clearly audible and the level in a 1/3rd octave band is greater than or equal to the following level in the two adjacent bands;
    - 15dB in low-frequency bands (25Hz to 125Hz);
    - 8dB in middle-frequency bands (160Hz to 400Hz), and;
    - 5dB in high-frequency bands (500Hz to 10,000Hz)

Noise measurements are usually 'A' weighted (to equate to human ear hearing) and the time-weighting 'Fast' is normally applied.

A-Weighted Decibels dB(A)

Noise, in its simplest form can be described as unwanted sound. Sound is the result of a propagating disturbance through a physical medium i.e. sound wave. Through air, it is perceived by the ear as a pressure wave superimposed upon the ambient air pressure about the ear of the listener. When the medium is a fixed body, it is called vibration.

'A' Weighting is standard weighting of the audible frequencies designed to reflect the response of the human ear to noise. At low and high frequencies, the human ear is not very sensitive, but between 500 Hz and 6 kHz the ear is much more sensitive. In the A-weighted system, the decibel values of sounds at low frequencies are reduced compared with un-weighted decibels, in which no correction is made for audio frequency.

Sound level (Lp dB) and sound power (L_W dB) are physical quantities which measure derivatives of the energy associated with a sound that can be measured by recording instruments.

Loudness is a psycho-physical subjective measure of the perceived response by the human auditory system to a sound. The loudness level of a sound is determined by adjusting a sound pressure level of a comparison pure tone of specified frequency until it is judged by normal hearing observers to be equal in loudness. Loudness level is expressed in phons.

In the mid-frequency range at sound pressures greater than approximately 2 x 10^{-3} Pa (40 dB re 20 µPa SPL), the following table summarises the average subjective perception of noise level changes.

Table 3.1: WHO International: Fundamentals of Acoustics

Change in Sound Level (dB)	Change in Power		Change in Apparent Loudness
	Decrease	Increase	
3	1/2	2	Just Perceptible
5	1/3	3	Clearly Noticeable
10	1/10	10	Half or Twice as Loud
20	1/100	100	Much Quieter or Louder

As can be seen in the above table, an increase of 3 dB is double the sound power level, however, the change in loudness is just perceptible.

The term Leq is used to express the average noise level. It is measured in dB(A) and measured over a defined period of time. Specifically, it is the constant level equivalent to the same acoustic energy as a given event. The Leq is written as LAeq when it is measured with the A frequency weighting.

4.0 EQUIPMENT USED

The equipment used for the noise monitoring was a Cirrus CR:171B Sound Level Meter, and CR:515 Acoustic Calibrator. Both the CR:171B meter and CR:515 calibrator were calibrated externally on 18th July 2019.

A calibration check of 94 dB(A) at 1kHz was carried out on the instrument before and after measurement. The calibrator is a Class 1 grade, which conforms to IEC 60942:2003.

The difference between the initial calibration value, any subsequent calibration check, and a final calibration check on completion of measurements did not exceed 0.5 dB, and the instrument calibration was found to be satisfactory.

Measurement periods were appropriate to establish a typical noise level reading at each location in order to establish a dB(A) $L_{Aeq}(T)$ reading.

5.0 METEOROLOGICAL CONDITIONS

Weather conditions during the survey were dry and calm with wind speeds of less than 5 m/s (the preferred limit for taking measurements).

The Sound Level Meter was also fitted with a windshield to minimise interference from meteorological conditions.

6.0 METHODOLOGY

6.1 BASELINE NOISE ASSESSMENT METHODOLOGY

The facility is located in an area rural in character with residences in the area predominantly linearly aligned along the existing road network.

Several submissions have been made with respect to the proposed development stating noise as a concern. All of the submission noise sensitive receptor locations are arrayed to the north of the proposed development at distances of 195m to 1.3km from the existing farm boundary.

As the primary determinant of noise impact at this development would be distance from the noise source, this study has taken the approach of assessing potential noise impacts at the closest northern noise sensitive receptor location. Potential noise impacts at residences further from the farm would be less than that at the closest noise sensitive receptor. The closest third-party noise sensitive receptor to the farm is as follows:

- NSR1 – Residence *c.*195m north of the existing farm boundary.

Baseline noise monitoring was carried out in general accordance with the British Standard EN BS 4142 '*Method for Rating Industrial Noise Affecting Mixed Residential and Industrial Areas*'.

Monitoring was carried out at an Ambient Noise (AM) monitoring location, where noise from the site was dominant and clearly audible, and at a Background Noise (BG) monitoring location, where the site was not audible and had no impact on the noise levels.

From the Ambient Noise Levels, it is possible to calculate a Specific Noise Level and a Rated Noise Level. This Rated Noise Level is then compared against the measured Background Noise Levels in order to determine the impact as a result of the facility.

Table 6.1: Noise Monitoring Locations

Ref. No.	Grid Ref	Location Type	Location
AN1	R 79096 23486	Ambient Noise Monitoring	North-Eastern Boundary
BG1	R 79167 24318	Background Noise Monitoring	Gateway *c.*880m North of the Site Boundary

Grid Ref Source: http://irish.gridreferencefinder.com

All measurements were taken at:

- 1.2 – 1.5 metres height above local ground level
- 1.0 – 5.0 metres away from reflective surfaces

These monitoring points are mapped in Appendix A.

Additional monitoring of existing noise sources was carried out where applicable.

6.2 NOISE PREDICTION METHODOLOGY

BS EN ISO 9613-2:1996 Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation

The noise prediction methodology used in this report is based upon the international standard ISO 9613-2 "*Attenuation of Sound during Propagation Outdoors*". This standard outlines a method for calculating the attenuation of sound during propagation outdoors in order to predict the levels of environmental noise at a distance from a variety of sources.

The central formula for this calculation is as follows:

$$A = A_{div} + A_{gr} + A_{bar} + A_{misc}$$

Where:

A is the attenuation due to site conditions
A_{div} is the attenuation due to the geometrical divergence (distance from source)
A_{gr} is the attenuation due to the ground effect
A_{bar} is the attenuation due to a barrier
A_{misc} is the attenuation due to miscellaneous other effects as appropriate

This attenuation factor is then subtracted from the predicted operational noise at the proposed activity. The resultant figure is the predicted noise from the proposed activity at a given noise sensitive location.

This figure may then be added logarithmically to the existing background noise at the noise sensitive location to attain the predicted noise level if the proposed activity were to begin.

Relevant Formulae

In order to carry out this predictive analysis, the following attenuation characteristics have been taken into account:

Divergence – A_{div}

The geometrical divergence accounts for the spherical spreading in the free field from the point sound source, causing attenuation due to the inverse square law. Divergence is calculated as follows:

$$A_{div} = 20.\log_{10} (d/d_0) + Q$$

Where:
d is the distance from the source to the receiver (m)
d_0 is the reference distance (1 m)
Q is a constant relating the sound power level to the sound pressure level at a reference distance d_0 which is 1 meter from a point source.

When a directivity factor is included, this attenuation figure converts the source Sound Power Level (L_W) to Sound Pressure Level (Lp). The calculation is frequency independent, therefore if the source noise is presented as A-weighted, the resulting receptor noise is also A-weighted.

BS EN ISO 12354‑4:2017 Building acoustics - Estimation of acoustic performance of buildings from the performance of elements - Part 4: Transmission of indoor sound to the outside

ISO 12354-4:2017 specifies a calculation model to estimate the sound power level radiated by the envelope of a building due to airborne sound inside that building.

The method defines the sound power level (L_W) of a calculated substitute point source for noise break out from the building elements and openings in a building.

Annex F of BS12354-4 provides a method for estimating the A-weighted Sound Power Level (L_{WA}) of a substitute point source at the façade of a building where the single figure internal A-weighted Sound Pressure Level (L_{pA}) and single figure Sound Reduction Indices (Rw / Dn,e,w) of building elements are known.

The following formulas from Annex F of BS12354-4 are used to determine the Sound Power Level (L_{WA}):

$$L_{WA} = L_{pA,in} - 6 - X'_{As} + 10 \lg \frac{S}{S_o} \quad \text{(F.1)}$$

where

$L_{pA,in}$	is the A-weighted sound pressure level at 1 m to 2 m from the inside of segment j, in decibels;
X'_{As}	is the quantity characterizing the A-weighted sound level difference over segment j for source spectrum *s*, in decibels;
S	is the area of segment j, in square metres;
S_o	is the reference area, in square metres; S_o = 1 m².

$$X'_{As} = -10 \lg \left(\sum_{i=1}^{m} \frac{S_i}{S} 10^{-\left(R_{w,i} + C_{s,i}\right)/10} + \sum_{i=1}^{m} \frac{A_o}{S} 10^{-\left(D_{n,e,w,1} + C_{s,i}\right)/10} \right) \quad \text{(F.2)}$$

where

$R_{w,i}$	is the weighted sound reduction index of element i, in decibels;
$D_{n,e,w,i}$	is the weighted element normalized level difference of a small element i, in decibels;
$C_{s,i}$	is the spectrum adaptation term for spectrum s of element i, in decibels;
S_i	is the area of element i, in square metres;
A_o	is the reference absorption area, in square metres; A_o = 10 m²;
m	is the number of large elements of the segment;
n	is the number of small elements of the segment;

The sound pressure level at a reception point outside the building is determined from the contributions of each substitute point source according to:

$$L_p = L_W + D_c - A_{tot} \quad \text{(1)}$$

where

L_p	is the sound pressure level at a reception point outside the building due to the sound radiation of a substitute point source, in decibels;
L_W	is the sound power level of the substitute point source, in decibels;
D_c	is the directivity correction for the substitute point sources in the direction of the reception point, in decibels;
A_{tot}	is the total attenuation that occurs during sound propagation from the substitute point source to the reception point, in decibels.

Note: In this assessment, the directivity correction (Dc / Q) has been incorporated into the Atot figure, in compliance with BS 9613-2.

6.3 NOISE SOURCE SPECIFICATIONS

6.3.1 Electrical Substation

The only construction and new equipment which would occur as a result of the proposed development would be the installation of an ESB Sub-station at the site.

The model of the transformer has not been chosen as yet, however, it would be chosen from the list provided in Appendix D. The specified sound power level (LwA) ratings for this equipment range from 51 dB to 83 dB.

The maximum LwA 83 dB (LpA 72 dB) rated transformer has been chosen for this assessment.

The transformer would be enclosed within the proposed sub-station building, as defined within the drawings submitted with the planning application. The construction of the walls of the building would be a concrete block cavity wall, with a 450mm inner leaf, 200mm cavity and 230mm outer leaf, plastered outer leaf.

No sound reduction index (Rw) could be found for this construction, and a reduction index for a similar construction of Rw 55 dB (100mm-75mm-100mm cavity wall, 13mm plaster both sides) has been used. As this construction would be of a lower mass than the proposed construction, it is anticipated that predicted noise impact levels will be over-estimated.

6.3.2 Pig Vocalisations

The request for further information has instructed to assess potential noise impacts as a result of the *increase to numbers of animals in the existing buildings, traffic movement and associated machinery*.

It is proposed to increase the capacity of the piggery from 600 sows to 1000 sows and their progeny at the farm.

In order to define noise levels from pigs at the site, source noise measurements were taken at external locations to sheds and escaping pig noise was recorded. Noise was recorded in the vicinity of doors and openings to the sheds in order to capture the maximum noise escaping.

In general, low level pig communications were not audible at external locations. Only high distress vocalisations were audible outside of the buildings. These occurred from individual pigs and were intermittent.

From a review of relevant literature, noise issues typically occur at pig farms during feeding and loading for transport. Where pigs are fed at set times in the day, and particularly where feed delivery is by farm operators, significant noise can occur from pigs in anticipation of feed. Noise can also occur as pigs are moved to a confined loading area to the trailer.

At the Ballyfaskin farm, pigs are fed using a best practice *ad libitum* mechanised feed delivery system. Feed is delivered continuously as required based on low level sensors within feed troughs. Therefore, no anticipatory noise from pigs is expected at the farm.

On the evening before loading and transport is to occur, farm operators move pigs into the loading area, in order to allow the pigs to settle prior to loading. This minimises the effort for operators during loading, as the pigs are not as agitated and, consequently, reduce noise generated as a result of loading. The loading bay is also located at the southern area of the farm, and noise propagating to the north would be shielded by the existing farm buildings.

It is noted that the intensity of noise from loading of pigs would not be expected to change as a result of the proposed development. However, the frequency of loading pigs would increase as the number of pigs onsite would increase.

As a result of the above, it is considered that the general noise levels of pigs at the farm would not significantly increase as a result of the proposed development due to the existing noise insulation properties of the farm buildings and the existing farming practices. General background noise levels at the farm would continue to be dominated by the operation of fans.

However, it is considered that the frequency of high pig vocalisations would increase as pig numbers at the site increase. The increased frequency may cause the proposed changes at the site to result in additional noise impact.

In order to define the maximum noise from pigs at the farm, maximum noise events of high pig vocalisations were selected from onsite monitoring. At 1 metre from building facades / openings, the average sound pressure level (Lp) of pig squeal events was found to be 82.4 dB LAFmax, and ranged from 87.4 dB LAFmax to 79.9 dB LAFmax.

The sound power level Lw of 95.4 dB LAFmax has been used in this assessment to represent maximum pig noise.

6.3.3 Site Traffic

The request for further information has instructed to assess potential noise impacts as a result of the *increase to numbers of animals in the existing buildings, traffic movement and associated machinery*.

Traffic noise associated with the site would include staff arriving and leaving the farm, slurry tractors during the open landspreading period and transport lorries removing pigs from the site.

The maximum expected noise impact which would occur as a result of traffic noise at the site would be due to animal haulage lorries. By necessity, for animal welfare reasons, pigs are loaded early in the morning so that loading and transport can occur in the cooler part of the day. Therefore, lorries would be leaving the site during the early morning, as is stated within submissions to the planning application.

Lorries enter the site from the southern entrance, at the dairy farm gate, and back-up to the loading bay on the southern boundary of the pig houses. When loaded, haulage lorries drive to the western side of the farm and then north along the yard to the exit gate in the north-western corner. Lorries then exit the site and turn left (south) on the R662, towards Mitchelstown and access to the motorway.

The ambient noise level of the area would be lower at this time of the morning, and therefore, the potential impact of noise from lorries would be increased.

Similarly as would occur with noise from pigs, as discussed above, it is not anticipated that noise from transport lorries would increase individually. Rather, the potential impact of the proposed development would be due to the expected increase in frequency.

In order to represent the maximum noise potential level of lorries traveling onsite and exiting the site, source noise levels have been taken from BS 5228-1 (2009) *Code of Practice for Noise and Vibration Control on Construction and Open Sites*. This guidance provides standard noise levels for typical industrial vehicles conducting tasks, idling and maximum pass-by noise level.

This report will use a sound pressure level (LpA) of 80 dB @10m drive-by maximum sound level for a 39t full road lorry conducting haulage (C6.21) (LpA 100 dB @1m or LwA 111 @1m).

7.0 MEASUREMENT RESULTS

The results summary tables below show the noise measurement results at all monitoring locations.

Associated particulars such as a description of the noise, the equipment operational/audible at each location and any interferences/background noise recorded are also provided in Appendix B.

For this assessment, the daytime monitoring was carried out between 11:17am and 18:06pm on Wednesday 5th February 2020, while night-time monitoring was carried out between 21:58pm on Wednesday 5th February and 01:25am Thursday 6th February 2020.

7.1 AMBIENT NOISE LEVELS - RESULTS

Definition:
Equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time, usually composed of sound from many sources near and far, at the assessment location over a given time interval, T.

Ambient Noise (Leq) measurements were taken at the site boundary location where the facility was still clearly audible and the dominant noise source.

Monitoring locations are mapped in Appendix A.

BS4142:2014 guidance recommends a 60-minutes monitoring period during the day from 07:00 - 23:00 and a shorter monitoring period of 15-minutes at night from 23:00 - 07:00. For this assessment the following reference time intervals were used to measure the ambient noise levels:

- 60-minutes duration during the daytime hours
- 30-minutes duration during the night-time hours

Table 7.1: Measured Ambient Noise Levels					
Ref	**Location**	**Time**	**L_{Aeq}**	**L_{A10}**	**L_{A90}**
Daytime					
AN1	North-Eastern Boundary, *c.*135m E-SE of site entrance	12:37	**53**	53	44
Night-time					
AN1	North-Eastern Boundary, *c.*135m E-SE of site entrance	00:20	**40**	43	36

7.2 BACKGROUND NOISE LEVELS - RESULTS

Definition:
A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels.

In order to determine the Background (L_{90}) noise levels at the closest noise sensitive receptors, monitoring was carried out at locations that represent the noise level that would be experienced at the NSR's in the absence of facility related noise.

Monitoring locations are mapped in Appendix A.

BS4142:2014 guidance recommends a 60-minutes monitoring period during the day from 07:00 - 23:00 and a shorter monitoring period of 15-minutes at night from 23:00 - 07:00. For this assessment the following reference time intervals were used to measure the ambient noise levels:

- 60-minutes duration during the daytime hours.
- 30-minutes duration during the night-time hours.

Table 7.2: Measured Background Noise Levels					
Ref	**Location**	**Time**	**L_{Aeq}**	**L_{A10}**	**L_{A90}**
Daytime					
BG1	Gateway *c.*880m North of the Site Boundary	11:17	62	55	**35**
Night-time					
BG1	Gateway *c.*880m North of the Site Boundary	21:58	58	42	**28**

7.3 PREDICTIVE NOISE ASSESSMENT - RESULTS

In order to determine the potential impact of noise from the proposed changes at the farm, the resultant noise levels at noise sensitive receptors have been calculated.

7.3.1 Prediction of Electric Sub-station Noise

It is assumed that the rear gable of the electric sub-station would face towards the north.

	Width (m)	Height (m)	Number (#)	S (m^2)
Gable Wall	4.000	2.715	1	10.860
			S (wall)	**10.860**
			S (total)	**10.860**

The following table determines the A-weighted sound level difference for the segment:

Attenuation Calculation	Concrete
Rw / Dn,e,w	55
Cs	0
Si	10.860
S	10.860
A_0	-
(Si/S)*(10^-((Rw+Cs)/10))	3.16E-06
(A_0/S)*(10^-((Dn,e,w+Cs)/10))	-
X'As	**55.00**

The following table determines the A-weighted Sound Power Level (L_{WA}) of a substitute point source on the façade segment as per formula 1 above:

Table 7.3: Electric Substation Source Noise	
Substitute Point Source	**Values**
LpA, in (dB)	72
Diffusivity Term (Cd)	-6
X'As	55.00
S	10.86
S_0	1
LwA (dB)	**21.36**

7.3.2 Prediction of Noise Levels at Receptor Façade

The equivalent external sound power level for substation noise has been calculated in section 7.3.2. The external sound power level for pig vocalisations were monitored at locations around the pig sheds and have been discussed in section 6.3.2. As stated in section 6.3.3, maximum pass-by traffic noise from a haulage lorry has been sourced from BS5228.

The following table determines the equivalent sound pressure level (LpA) at the nearest receptor, based upon the formula for divergence between the source and receptor.

Lp = Lw-20Log(d/d0)-Q factor

Table 7.4: Predicted Sound Pressure Levels (LpA) at NSR1

Sound Pressure Level at Receptor	Sub-Station	Pig Noise	Traffic
L_{WA} (dB)	21	95	111
distance (m)	281	395	124
Q factor (dB)*	8	8	11
20Log(d) (dB)	49	52	42
Atotal (Adiv + Q)	57	60	53
L_{pA} (dB) at NSR1	<0	35	58

* Directivity factor (whole sphere = 11 dB, half sphere = 8 dB, quarter sphere = 5 dB)

The methodology outlined in BS4142 requires that predicted noise levels be compared to existing L_{90} figures at noise sensitive locations in order to determine the likely noise impact. The BS4142 assessment has been carried out in the following section.

A noise character penalty of +5 has been applied to noise levels in order to account for potential subjective annoyance factors for noise sources.

The following table determines the likelihood of noise impacts at the noise sensitive receptor following the BS4142 methodology:

Table 7.5: BS4142 Noise Assessment NSR1

Source	Background Noise (L_{90})	Predicted Noise			Difference from Background
		Predicted Noise	Predicted Penalty	Rating Level	
Daytime					
Sub-Station	35	0	-	0	-35
Pig Noise	35	35	+5	40	5
Haulage	35	58	+5	63	28
Night-time					
Sub-Station	28	0	-	0	-28
Pig Noise	28	35	+5	40	12
Haulage	28	58	+5	63	35

8.0 DISCUSSION

8.1 GENERAL DISCUSSION

Baseline noise monitoring was carried out in general accordance with the British Standard EN BS 4142 '*Method for Rating Industrial Noise Affecting Mixed Residential and Industrial Areas*'.

Noise levels at the ambient noise monitoring location (AN1) (site noise dominant) were determined to be LAeq 53 dB during the daytime and LAeq 40 dB during night-time monitoring.

Noise at the farm boundary was found to be characterised by continuous low fan noise. Intermittent noise from construction/installation in the new mill shed, site car traffic, pig vocalisations and feed mixing equipment also added to on-site noise levels.

Noise levels at the background noise monitoring location (BG1) (site noise absent) was determined to be L_{A90} 35 dB during the daytime and L_{A90} 28 dB during night-time monitoring.

Noise at the background monitoring location was found to be characterised by distant low traffic noise and noise from wind in trees. Intermittent noise from traffic passing on the R662 and birds singing also added to background noise levels.

Existing farm noise levels recorded at AN1, when divergence to NSR1 is subtracted (c.239metres), would be in excess of 10 dB below the recorded background noise level for the area. Therefore, no potential noise impact would be anticipated due to the recorded existing farm noise level at noise sensitive receptors, as per the BS4142 methodology.

The noise limits defined in the sites EPA IE licence apply at noise sensitive receptor locations. However, the recorded activity noise at the boundary (AN1) was found to be in compliance with the $L_{Ar,T}$ 55 dBA day-time and $L_{Ar,T}$ 45 dBA night-time noise limits.

8.2 BS4142:2014 IMPACT ASSESSMENT

A BS4142 has been completed on the potential noise impacts which may occur as a result of the proposed permission (Planning Ref:191135) from Limerick Co Co to increase the capacity of the piggery from 600 sows to 1000 sows and their progeny and the construction of a new electrical substation.

BS4142 infers that for a given excess of the rating level over the background level, the impacts and potential likelihood of complaints are as follows:

Excess	Likelihood of Complaints	Interpretation of Impact
≥ 10dB	Likely	An indication of a significant adverse impact.
> 5dB	Possible	An indication of an adverse impact.
≤ 5 dB	Unlikely	An indication that it is unlikely that the specific sound source will have an adverse impact or a significant adverse impact.
< 0dB	Very Unlikely	An indication that the specific sound source will have a low impact.

Adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact.

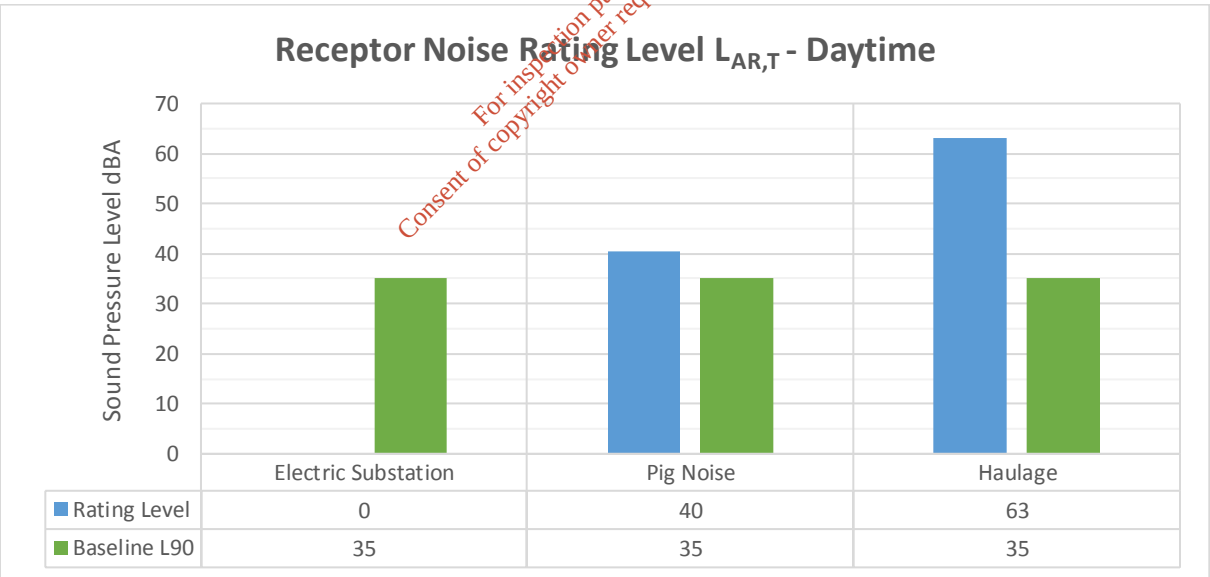


***Figure 8.1**: Daytime Background L_{90} vs Predicted Noise Levels at NSR1*

It should be noted that predicted noise levels only consider divergence, as this would be the primary parameter influencing noise between the source and receptor. Other parameters which would contribute the reduction of sound such as ground absorption, absorption by vegetation or existing barriers or buildings have not been considered. Therefore, this may be considered a worst case scenario for noise from the farm.

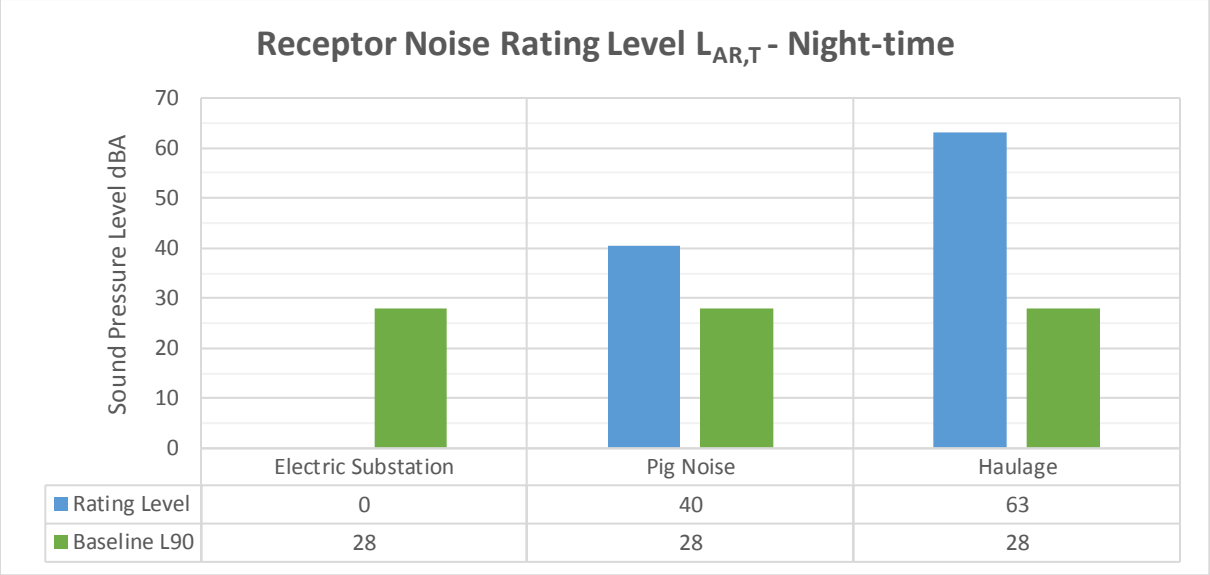


***Figure 8.2**: Night-time Background L_{90} vs Predicted Noise Levels at NSR1*

The predicted noise level for the Electric Substation was found to be less than 0 dB at NSR1. The predicted noise level at the substitute point source at the sub-station building façade was calculated to be Lw 21 dBA (Lp 13 dBA) which is below the recorded day-time and night-time background noise levels for the area. Therefore, there is not anticipated to be any potential for noise impacts as a result of the proposed sub-station at noise sensitive locations.

Maximum pig noise events (L_{AFmax}) have been predicted to generate noise levels at 5dB above existing day-time background noise levels and 12dB above existing night-time background noise levels at NSR1. Therefore, potential noise impacts / complaints would be considered "possible" to "likely", in accordance with the BS4142 methodology.

Maximum pass-by haulage lorry events (L_{AFmax}) have been predicted to generate noise levels at 28dB above existing day-time background noise levels and 35dB above existing night-time background noise levels at NSR1. Therefore, potential noise impacts / complaints would be considered "likely", in accordance with the BS4142 methodology.

8.3 PROPOSED NOISE MITIGATION MEASURES

In order to ensure that peak noise levels at the factory fall into the "very unlikely" or "unlikely" BS4142 categories, it would be necessary for noise mitigation to be applied to noise from the northernmost pig houses, and haulage lorries exiting the site.

A standard noise mitigation option is to install a barrier or earth berm around a noise source, or along the boundary facing a noise sensitive receptor. Depending upon the relative heights of the source, receptor and top of the barrier, theoretical noise reductions of up to 15 dB are possible. Actual noise reduction in the field is typically found to be circa 10 dB.

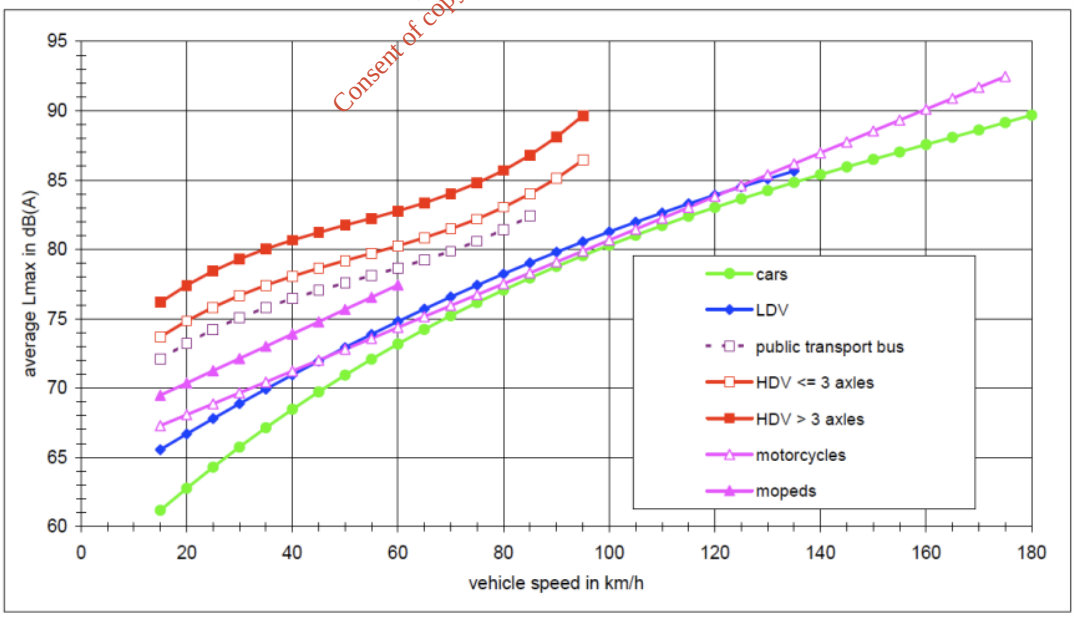
It is recommended that an earth berm be constructed along the northern boundary of the site. The earth berm should be a minimum of;

- 1.5m tall above the ground level of the entrance / exit roadway,
- 1.5m tall above the ground level of the pig house floor level.

Figure 8.3 below shows the recommended arrangement of the proposed earth berms in order to mitigate against noise from the pig houses and traffic exiting the farmyard.

***Figure 8.3**: Potential arrangement of proposed noise barrier*

It is also recommended that a site speed limit be set to 20 km/h within the farm. As can be seen from the following graph, the modelled maximum pass-by noise level of Lp_{AFmax} 100 dB used in this report would be a worst case scenario. Noise levels reported in the above graph range from Lp_{AFmax} 76 to 90 dB for Heavy Duty Vehicles > 3 axles.



(Source: Ellebjerg 2008a:12, Figure 2.1)

***Figure 8.4**: Average maximum noise emissions for different vehicle types in free flowing traffic.*

The limitation of onsite speeds to 20 km/h, and the installation of an earth berm along the exit road would minimise the potential for noise impacts to noise sensitive locations.

Hauliers should be informed of noise considerations when driving within the site and avoid any unnecessary revving, particularly at night. Signage should be placed at entrances and exits to the farm instructing hauliers to consider neighbours when exiting the site.

Following mitigation, potential maximum traffic noise levels (L_{AFmax}) are predicted to be at 15 dB (actual level L_{AFmax} 50 dB) above existing day-time background noise levels and 22 dB (actual level L_{AFmax} 50 dB) above existing night-time background noise levels at NSR1.

It is noted that traffic noise from cars passing the background noise monitoring location BG1 achieved L_{AFmax} noise levels of 86 dB during daytime monitoring and 88 dB during night-time monitoring. As such, predicted onsite traffic L_{AFmax} noise levels, following mitigation, would be significantly lower than existing traffic noise on the R662 road, which would be unaffected by the development.

9.0 CONCLUSIONS

The conclusions of this BS4142 assessment are as follows;

- Farm noise levels at the ambient noise monitoring location (AN1) (site noise dominant) were determined to be LAeq 53 dB during the daytime and LAeq 40 dB during night-time monitoring.

- Noise levels at the background noise monitoring location (BG1) (site noise absent) was determined to be L_{A90} 35 dB during the daytime and L_{A90} 28 dB during night-time monitoring.

- Existing farm noise levels recorded at AN1 would be in excess of 10 dB below the recorded background noise level for the area. As per the BS4142 methodology, this would be "*an indication that the specific sound source will have a low impact*".

- The recorded activity noise at the boundary (AN1) was found to be in compliance with the EPA IE licence $L_{Ar,T}$ 55 dBA day-time and $L_{Ar,T}$ 45 dBA night-time noise limits.

- The predicted noise level for the Electric Substation was found to be less than 0 dB at NSR1, more than 10 dB below day-time and night-time background noise levels. As per the BS4142 methodology, this would be "*an indication that the specific sound source will have a low impact*".

- L_{AFmax} noise from pig vocalisations and haulage lorries have been predicted to generate noise levels of 5 to 28 dB above day-time background noise levels and 12 to 35 dB above night-time background noise levels. As per the BS4142 methodology, this would be "*an indication an adverse, to significant adverse impact*".

- It has been recommended that the applicant provide for noise mitigation measures, to include
    - An earth berm along the northern boundary of the farm,
    - Onsite traffic speed limit of 20 km /h,

- Following implementation of the proposed noise mitigation measures, it is considered that the farm would have a low noise impact at NSR1 and complaints would be very unlikely, as defined in BS4142.

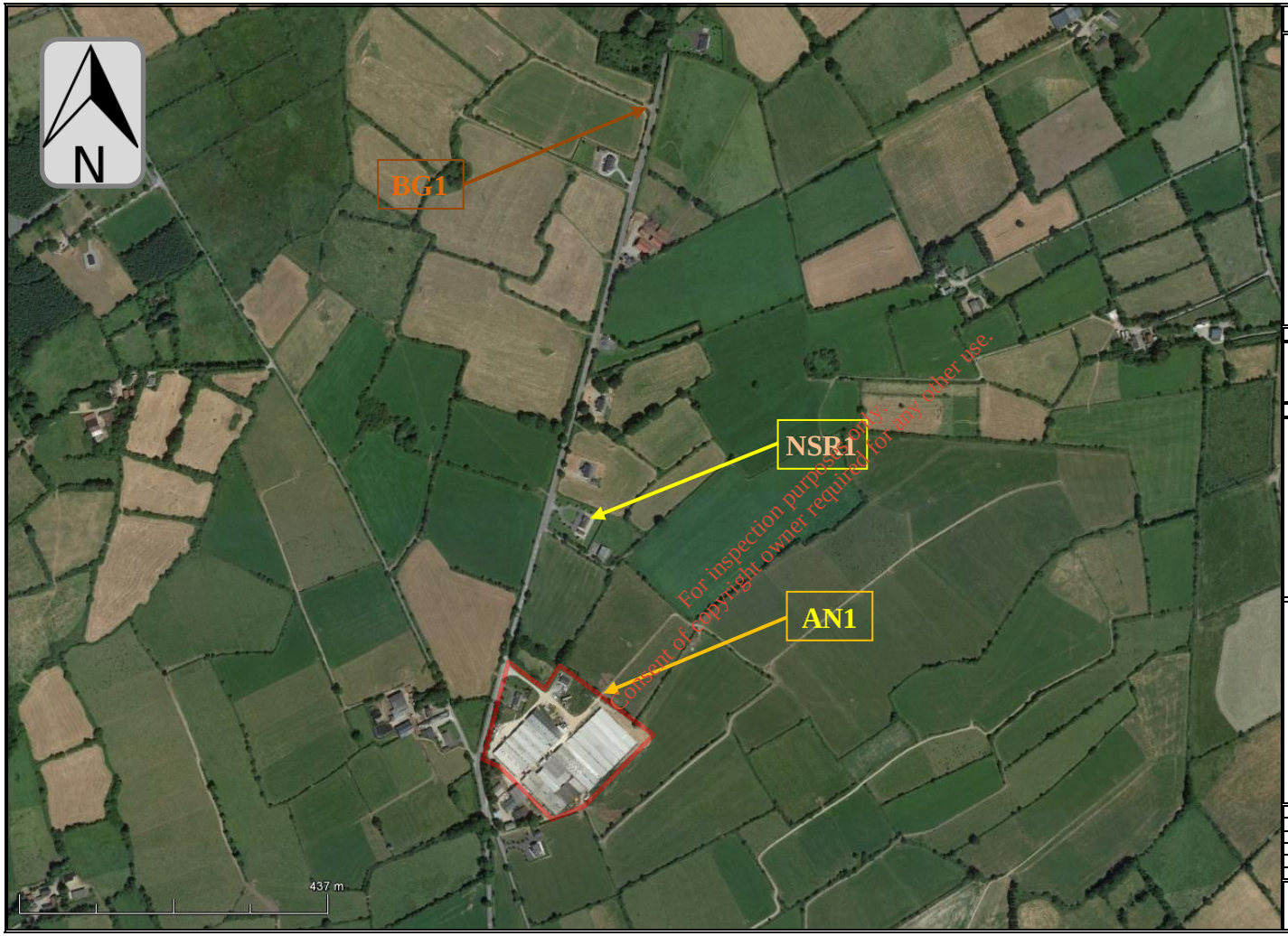
10.0 REFERENCES

- BS EN ISO 4142:2014 *Methods for Rating and Assessing Industrial and Commercial Sound*.
- ISO 9613-2:1996 *Attenuation of Sound during Propagation Outdoors*.
- BS EN ISO 12354‑4:2017 Building acoustics - Estimation of acoustic performance of buildings from the performance of elements - Part 4: Transmission of indoor sound to the outside
- Grant S. Anderson and Ulrich J. Kurze, "*Outdoor Sound Propagation*," Chpt. 5 in Noise and Vibration Control Engineering – Principals and Applications, edited by L.L. Beranek and I.L. Vér, (John Wiley & Sons, NY, NY 1992).
- BS EN ISO 5228-1:2009 *Code of practice for noise and vibration control on construction and open sites*.
- EPA (2016) *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4).*
- World Health Organization (1999) *Guidelines for Community Noise*, Birgitta Berglund, Thomas Lindvall, Dietrich H Schwela.
- BREF Document for Intensive Rearing of Poultry or Pigs (2017) Reference Document for the Intensive Rearing of Poultry or Pigs.
- Joint Research Centre "*Best Available Techniques (BAT) Reference Document for the Intensive Rearing of Poultry and Pigs*" Draft 2, European IPPC Bureau, August 2013.
- P. Mitchell (December 2009), "*Speed and Road Traffic Noise*" UK Noise Association.
- Ellebjerg, L. (2008) "*Noise Reduction in Urban Areas from Traffic and Driver Management*"

APPENDIX A

- SITE MAPS WITH MONITORING POINTS -

APPENDIX A: NOISE MONITORING LOCATIONS



Notes

– Boundary of Premises

Project Title:

Location Map 1

Client Name:

BALLYFASKIN ENTERPRISES LTD, BALLYFASKIN, BALLYLANDERS, CO. LIMERICK

PANTHER ENVIRONMENTAL SOLUTIONS LTD
UNITS 3 & 4
INNOVATION CENTRE
GREEN ROAD
CARLOW
R93 W248
TELE: 059 91 34222
MOBILE: 087 851 9284
EMAIL:info@pantherwms.com
WEB: www.pantherwms.com

Drawing Status:	Scale:	NTS	A4
Report	Datum:	Google Pro	
Drawing Number:	Drawn:	NR	
	Checked:	MF	
Revision:	Approved:	-	
R0	Date:	20/02/2020	

APPENDIX B

- NOISE MONITORING FIELD SHEETS -

Daytime

NOISE ASSESSMENT TABLE					
Reference	AN1	**Result**	**$L_{eq(30)}$**	53	NP
Location	North-Eastern Boundary		**L_{10}**	53	
Times	12:37 pm 05-02-2020		**L_{90}**	44	

Equipment Audible	**Description of Noise**
Milling Shed. Feed Silos Fan Noise Pigs. Internal traffic.	Intermittent Construction Noise (installing equipment) Short period of silos discharging to mixer. V. lowly audible continuous fan noise. Intermittent pig vocalizations. Intermittent cars on farm hardcore.

Interferences/ Background Noise	Traffic on R662, common. Bird Song. Tree in intermittent breeze.
Meteorological Data	Dry, calm and cloudy, wind speeds <5m/s
Assessment	• This daytime ambient noise monitoring location is situated on the north-eastern boundary of the site. • The monitoring point is approximately 18-meters north of the closest shed containing animals. • Road traffic and bird noise added to the background noise levels at this location. • The Leq and L_{10} were slightly elevated as a result of internal and external traffic and noise from equipment installation within the milling shed. • The L_{90}, which may be used to give an indication of the actual background noise in the area, was determined to be 44 dB(A). • The Leq at this location was determined to be 53 dB(A), which is below the 55 dB(A) limit as per the site EPA licence. • Site related noise at this monitoring location is therefore in compliance with the sites IE licence conditions.

NOISE ASSESSMENT TABLE					
Reference	BG1	**Result**	**$L_{eq(30)}$**	62	NP
Location	Gateway *c.*880m North of the Site Boundary		**L_{10}**	55	
Times	11:17 am 05-02-2020		**L_{90}**	35	
Equipment Audible		**Description of Noise**			
N/A		N/A			
Interferences/ Background Noise	Traffic on the Adjacent R662 road. Distant traffic noise in other local roads. Bird Song.				
Meteorological Data	Dry, calm and cloudy, wind speeds <5m/s				
Assessment	• This daytime background noise monitoring location is situated *c.*880m north of the site boundary, at a distance when the site is not audible. • Traffic noise added to the background noise levels at this location. • The Leq and L_{10} were slightly elevated as a result of traffic noise from the adjacent local road. • The L_{90}, which may be used to give an indication of the actual background noise in the area, was determined to be 35 dB(A).				

Night-time

NOISE ASSESSMENT TABLE					
Reference	AN1	**Result**	**$L_{eq(30)}$**	40	NP
Location	North-Eastern Boundary		**L_{10}**	43	
Times	00:20 am 06-02-2020		**L_{90}**	36	
Equipment Audible		**Description of Noise**			
Fan Noise Pigs		V. lowly audible continuous fan noise. Intermittent pig vocalizations.			
Interferences/ Background Noise	Traffic on R662, intermittent. Tree in intermittent breeze.				
Meteorological Data	Dry, calm and cloudy, wind speeds <5m/s				
Assessment	• This night-time ambient noise monitoring location is situated on the north-eastern boundary of the site. • The monitoring point is approximately 18-meters north of the closest shed containing animals. • The Leq and L_{10} were slightly elevated as a result of intermittent road traffic and intermittent pig vocalisations, which added to the background noise levels at this location. • The L_{90}, which may be used to give an indication of the actual background noise in the area, was determined to be 36 dB(A). • The Leq at this location was determined to be 40 dB(A), which is below the 45 dB(A) limit as per the site EPA licence. • Site related noise at this monitoring location is therefore in compliance with the sites IE licence conditions.				

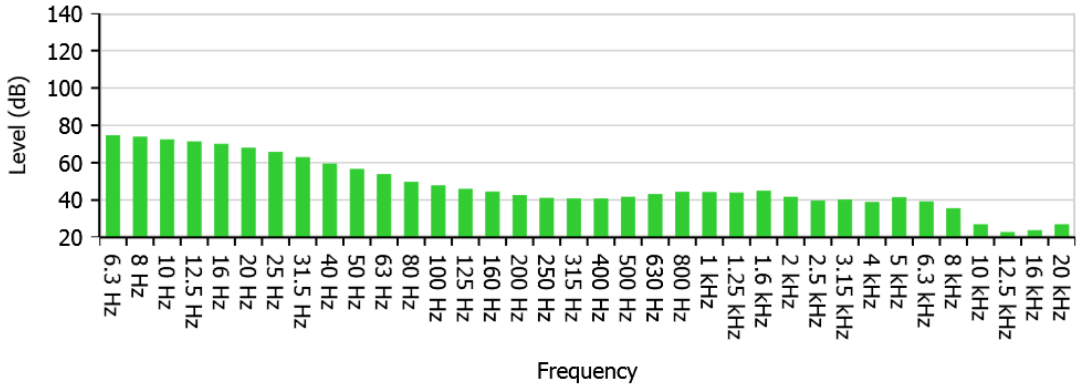
<table>
<tr><th colspan="6">NOISE ASSESSMENT TABLE</th></tr>
<tr><td>Reference</td><td>BG1</td><td rowspan="3">Result</td><td>$L_{eq(30)}$</td><td>58</td><td rowspan="3">NP</td></tr>
<tr><td>Location</td><td>Gateway c.880m North of the Site Boundary</td><td>L_{10}</td><td>42</td></tr>
<tr><td>Times</td><td>21:58 pm
05-02-2020</td><td>L_{90}</td><td>28</td></tr>
<tr><td colspan="3">Equipment Audible</td><td colspan="3">Description of Noise</td></tr>
<tr><td colspan="3">N/A</td><td colspan="3">N/A</td></tr>
<tr><td>Interferences/ Background Noise</td><td colspan="5">Traffic on the Adjacent R662 road.
Distant traffic noise in other local roads.</td></tr>
<tr><td>Meteorological Data</td><td colspan="5">Dry, calm and cloudy, wind speeds <5m/s</td></tr>
<tr><td>Assessment</td><td colspan="5">• This night-time background noise monitoring location is situated c.880m north of the site boundary, at a distance when the site is not audible.
• Traffic noise added to the background noise levels at this location.
• The Leq and L_{10} were slightly elevated as a result of traffic noise from the adjacent local road.
• The L_{90}, which may be used to give an indication of the actual background noise in the area, was determined to be 28 dB(A).</td></tr>
</table>

APPENDIX C

- AMBIENT NOISE THIRD OCTAVE SHEETS -

Daytime

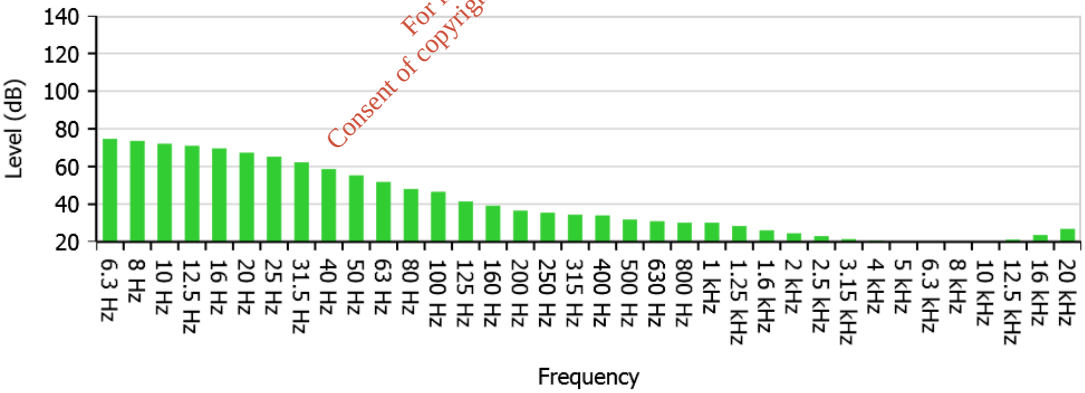
AN1 – 05/02/2020 (12:37 - 13:37)



Frequency (Hz)	6.3	8	10	12.5	16	20	25	31.5	40
Level (dB)	74.5	73.7	72.3	71.2	69.9	67.8	65.6	62.8	59.3
-	**50**	**63**	**80**	**100**	**125**	**160**	**200**	**250**	**315**
-	56.4	53.7	49.6	47.6	45.7	44.3	42.4	41.0	40.6
-	**400**	**500**	**630**	**800**	**1 000**	**1 250**	**1 600**	**2 000**	**2 500**
-	40.5	41.5	43.0	44.2	44.1	43.8	44.8	41.5	39.5
-	**3 150**	**4 000**	**5 000**	**6 300**	**8 000**	**10 000**	**12 500**	**16 000**	**20 000**
-	40.0	38.7	41.3	39.1	35.4	26.8	22.6	23.7	26.8

Night-time

AN1 — 06/02/2020 (00:20 - 00:50)



Frequency (Hz)	6.3	8	10	12.5	16	20	25	31.5	40
Level (dB)	74.4	73.4	71.8	70.8	69.4	67.1	65.0	62.1	58.4
-	**50**	**63**	**80**	**100**	**125**	**160**	**200**	**250**	**315**
-	55.1	51.6	47.9	46.3	41.2	39.0	36.3	35.2	34.3
-	**400**	**500**	**630**	**800**	**1 000**	**1 250**	**1 600**	**2 000**	**2 500**
-	33.8	31.6	30.8	30.0	30.0	28.1	26.0	24.3	22.8
-	**3 150**	**4 000**	**5 000**	**6 300**	**8 000**	**10 000**	**12 500**	**16 000**	**20 000**
-	21.3	20.4	19.1	18.6	18.6	19.3	20.9	23.4	26.7

APPENDIX D

- EQUIPMENT NOISE SPECIFICATIONS -

Electrical Sub-Station

Green efficiency

MF Trasformatori

CAST RESIN

TR-PA

from 100 to 3150 kVA - 17,5 – 24 kV
losses Ao - Ak according to
IEC EN 50541-1

GENERAL INFORMATION

At present, the improvement of the energy efficiency cannot be considered a slogan anymore, but a need of our time. TR-PA series high efficiency transformers are created for this purpose guaranteeing:

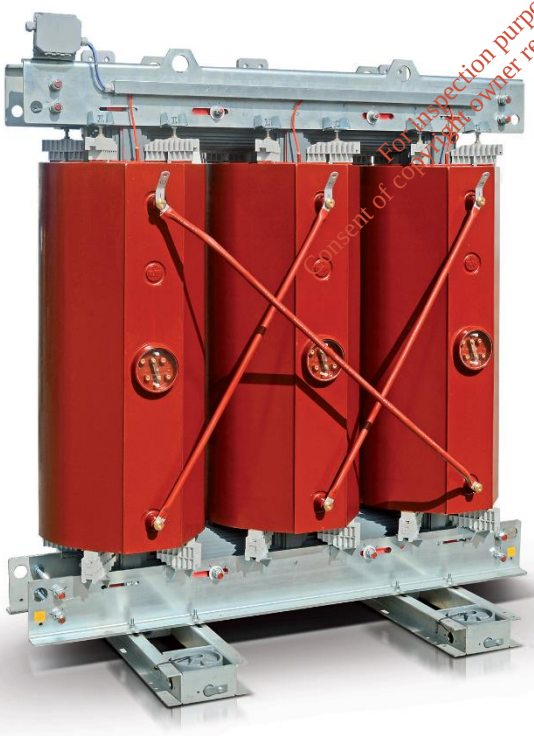
- savings in operating costs of the plant, due to low values of losses.
- consumption reduction o f energy resources.
- reduction of CO_2 emissions.

A
B
C
Ao Ak

ANNUAL SAVINGS (MAXIMUM) COMPARED TO TRANSFORMERS WITH LOSSES, ACCORDING TO HD 538.1 / HD 538.2

RATED OUTPUT kVA	100	160	250	400	630	800	1.000	1.250	1.600	2.000	2.500	3.150
LOW CONSUMPTION (MWh)	3,8	5,3	6,7	12,7	9,2	18,4	24,1	26,3	34,2	29,8	51,7	71,8
LOW EMISSIONS CO_2 (T)	2,8	3,9	5,0	9,5	6,9	13,8	18,1	19,7	25,6	22,3	38,8	53,9
ENERGY SAVINGS TOE *	0,7	1,0	1,2	2,4	1,7	3,4	4,5	4,9	6,4	5,6	9,7	13,4

* TONNE OF OIL EQUIVALENT



PARTICULARITY

Reference norms :

- CEI EN 60067-1,2,3,4,5 -11
- CEI EN 50541-1

The phases of design and building, in addition to their compliance with IEC EN norms, take into account the following regulations:

- ISO 9001 : 2008 regarding the quality standards and procedures .
- ISO 14001 : 2004 regarding the environmental issues .

Easy and fast to install are suitable for use in:

- MV/LV prefabricated substation and substation with reduced dimensions.
- fire and pollution hazard areas.
- buildings with public access.

Moreover, their disposal is simple and with low environmental impact.

DESCRIPTION

The three-phase cast resin transformers have the following features:

- MV windings encapsulated in cast resin.
- LV windings impregnated with resin.

Magnetic core made using magnetic grain-oriented steel sheets with low loss, and the joints are Step-Lap inserted sheet.

- Level of partial discharges < 10 pC.
- Thermal class F – Temperature rise 100 K.
- Ambient temperature ≤ 40°C, altitude ≤ 1000 m.
- Self-extinguishing with low emission of gas, classification F1.
- Resistant to thermal shock, classification C2.
- Resistant to condensation and humidity, classification E2.

COMPLETION ACCESSORIES ALWAYS PROVIDED

- LV terminal connector plates
- MV voltage variation by off circuit tappings links
- Rating plate
- Lifting lugs
- 2 earthing points
- 4 bi-directional flat rollers

FROM 100 TO 3150 KVA 17,5 24 KV
LOSSES Ao - Ak ACCORDING TO
IEC EN 50541 1

Green efficiency

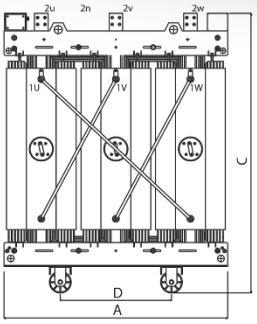
CAST RESIN

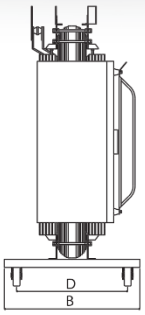
TR-PA

RATED OUTPUT kVA		100	160	250	400	630	800	1.000	1.250	1.600	2.000	2.500	3.150
NO-LOAD LOSSES	W	280	350	520	750	1.100	1.300	1.550	1.800	2.200	2.600	3.100	3.800
LOAD LOSSES AT 75 °C	W	1.575	2.275	2.975	3.950	6.200	7.000	7.875	9.625	11.375	14.000	16.625	19.250
LOAD LOSSES AT 120 °C	W	1.800	2.600	3.400	4.500	7.100	8.000	9.000	11.000	13.000	16.000	19.000	22.000
NO-LOAD CURRENT	%	1	0,9	0,8	0,8	0,8	0,6	0,6	0,6	0,6	0,6	0,4	0,4
IMPEDANCE VOLTAGE	%	6	6	6	6	6	6	6	6	6	6	6	6
INRUSH CURRENT IE/IN		11,5	10,5	10,00	9,5	9,5	9	9	8,5	8,5	8	8	7,5
EFFICIENCY AT 75°C													
COSΦ 1 100% LOAD	%	98,15	98,36	98,60	98,83	98,84	98,96	99,06	99,09	99,15	99,17	99,21	99,27
COSΦ 1 75% LOAD	%	98,45	98,65	98,83	99,01	99,03	99,13	99,20	99,23	99,28	99,30	99,34	99,38
COSΦ 0,9 100% LOAD	%	97,90	98,14	98,41	98,67	98,68	98,82	98,93	98,96	99,04	99,06	99,10	99,17
COSΦ 0,9 75% LOAD	%	98,25	98,47	98,68	98,88	98,90	99,01	99,10	99,13	99,19	99,21	99,25	99,30
EFFICIENCY AT 75°C													
COSΦ 1 100% LOAD	%	1,74	1,59	1,36	1,16	1,16	1,05	0,96	0,95	0,89	0,88	0,84	0,79
COSΦ 0,9 100% LOAD	%	4,04	3,93	3,75	3,59	3,59	3,5	3,43	3,41	3,36	3,36	3,33	3,28
NOISE													
SOUND POWER LEVEL (LwA)	dB(A)	51	54	57	60	62	64	65	67	68	70	71	74

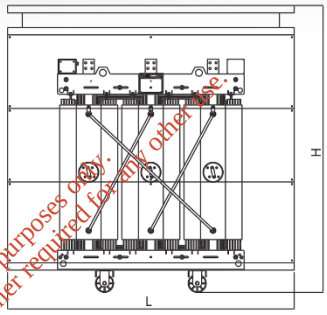
SIZES AND WEIGHTS (INDICATIVE)

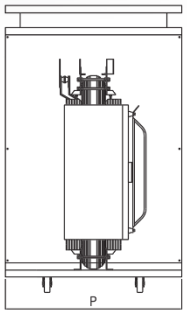
Without enclosure IP 00





With IP 31 Protective enclosure





INSULATION VOLTAGE 17,5 kV		100	160	250	400	630	800	1000	1250	1600	2000	2500	3150
LENGTH (A)	mm	1.000	1.100	1.250	1.450	1.450	1.650	1.650	1.650	1.900	1.900	1.900	2.200
DEPTH (B)	mm	650	650	650	800	800	1.000	1.000	1.000	1.200	1.200	1.200	1.200
HEIGHT (C)	mm	1.150	1.250	1.350	1.500	1.700	1.800	1.900	2.050	2.150	2.250	2.350	2.550
WHEEL INTERAXIS (D)	mm	520	520	520	670	670	820	820	820	1.000	1.000	1.000	1.000
WHEEL DIAMETER	mm	100	100	100	100	160	160	160	160	160	160	160	160
WEIGHT	kg	600	750	1.000	1.400	1.750	2.150	2.550	2.900	3.400	3.900	4.750	6.100

PROTECTIVE ENCLOSURE IP31		TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5
LENGTH (L)	mm	1.700	1.950	2.200	2.500	2.800
DEPTH (P)	mm	1.000	1.200	1.300	1.500	1.500
HEIGHT (H)	mm	1.850	2.000	2.400	2.650	2.900
ENCLOSURE WEIGHT	kg	220	260	320	360	400

INSULATION VOLTAGE 24 kV		100	160	250	400	630	800	1000	1250	1600	2000	2500	3150
LENGTH (A)	mm	1.100	1.150	1.250	1.450	1.650	1.650	1.650	1.900	1.900	1.900	1.900	2.200
DEPTH (B)	mm	650	650	650	800	1.000	1.000	1.000	1.200	1.200	1.200	1.200	1.200
HEIGHT (C)	mm	1.200	1.350	1.400	1.550	1.750	1.850	1.950	2.050	2.150	2.250	2.400	2.550
WHEEL INTERAXIS (D)	mm	520	520	670	670	820	820	820	1.000	1.000	1.000	1.000	1.000
WHEEL DIAMETER	mm	100	100	100	100	160	160	160	160	160	160	160	160
WEIGHT	kg	700	850	1.150	1.600	1.900	2.350	2.750	3.100	3.700	4.400	5.250	6.250

PROTECTIVE ENCLOSURE IP31		TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5
LENGTH (L)	mm	1700	1950	2200	2500	2.800
DEPTH (P)	mm	1000	1200	1300	1500	1.500
HEIGHT (H)	mm	1850	2000	2400	2650	2.900
ENCLOSURE WEIGHT	kg	220	260	320	360	400

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Green efficiency

MF Trasformatori

CAST RESIN

TR-PB

from 100 to 3150 kVA - 17,5 – 24 kV
losses Bo - Bk according to
IEC EN 50541-1

GENERAL INFORMATION

At present, the improvement of the energy efficiency cannot be considered a slogan anymore, but a need of our time.
TR-PB series high efficiency transformers are created for this purpose guaranteeing:

- savings in operating costs of the plant, due to low values of losses.
- consumption reduction of energy resources.
- reduction of CO_2 emissions.

ANNUAL SAVINGS (MAXIMUM) COMPARED TO TRANSFORMERS WITH LOSSES, ACCORDING TO HD 538.1 / HD 538.2

RATED OUTPUT KVA	100	160	250	400	630	800	1.000	1.250	1.600	2.000	2.500	3.150
LOW CONSUMPTION (MWh)	1,4	1,5	2,0	2,3	3,5	4,4	4,4	6,1	6,1	8,8	12,3	14,9
LOW EMISSIONS CO_2 (T)	0,7	1,1	1,5	1,7	2,6	3,3	3,3	4,6	4,6	6,6	9,2	11,2
ENERGY SAVINGS TOE *	0,2	0,3	0,4	0,5	0,7	0,8	0,8	1,2	1,2	1,6	2,3	2,8

*TONNE OF OIL EQUIVALENT

PARTICULARITY

Reference norms :

- CEI EN 60067-1,2,3,4,5 -11
- CEI EN 50541-1

The phases of design and building, in addition to their compliance with IEC EN norms, take into account the following regulations:

- ISO 9001 : 2008 regarding the quality standards and procedures .
- ISO 14001 : 2004 regarding the environmental issues .

Easy and fast to install are suitable for use in:

- MV/LV prefabricated substation and substation with reduced dimensions.
- fire and pollution hazard areas.
- buildings with public access.

Moreover, their disposal is simple and with low environmental impact.

DESCRIPTION

The three-phase cast resin transformers have the following features:

- MV windings encapsulated in cast resin.
- LV windings impregnated with resin.

Magnetic core made using magnetic grain-oriented steel sheets with low loss, and the joints are Step-Lap inserted sheet.

- Level of partial discharges < 10 pC.
- Thermal class F – Temperature rise 100 K.
- Ambient temperature ≤ 40°C, altitude ≤ 1000 m.
- Self-extinguishing with low emission of gas, classification F1.
- Resistant to thermal shock, classification C2.
- Resistant to condensation and humidity, classification E2.

ACCESSORIES ALWAYS PROVIDED

- LV terminal connector plates
- MV voltage variation by off circuit tappings links
- Rating plate
- Lifting lugs
- 2 earthing points
- 4 bi-directional flat rollers

FROM 100 TO 3150 KVA 17,5 24 KV
LOSSES Bo - Bk ACCORDING TO
IEC EN 505411

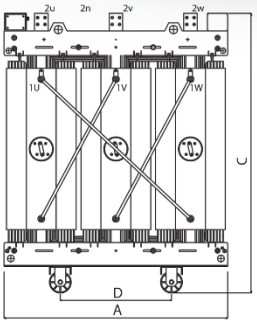
Green efficiency

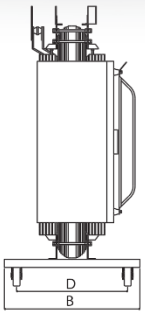
CAST RESIN
TR-PB

RATED OUTPUT kVA		100	160	250	400	630	800	1.000	1.250	1.600	2.000	2.500	3.150
NO-LOAD LOSSES	W	340	480	650	940	1250	1.500	1.800	2.100	2.400	3.000	3.600	4.300
LOAD LOSSES AT 75 °C	W	1.800	2.550	3.325	4.800	6.650	8.225	9.625	11.375	14.000	15.750	20.125	24.500
LOAD LOSSES AT 120 °C	W	2.050	2.900	3.800	5.500	7.600	9.400	11.000	13.000	16.000	18.000	23.000	28.000
NO-LOAD CURRENT	%		1,2	1,4	1	0,8	0,8	0,8	0,8	0,6	0.8	0,6	0,6
IMPEDANCE VOLTAGE	%	6	6	6,00	6	6	6	6	6	6	6	6	6
INRUSH CURRENT IE/IN		12,3	12,9	12,00	11,8	11	9,6	9,4	9,2	9	8,8	8,8	8,4
EFFICIENCY AT 75°C													
COSΦ 1 100% LOAD	%	97,87	98,11	98,41	98,57	98,75	98,79	98,86	98,92	98,98	99,06	99,05	99,09
COSΦ 1 75% LOAD	%	98,20	98,41	98,66	98,79	98,95	98,98	99,04	99,10	99,15	99,21	99,21	99,24
COSΦ 0,9 100% LOAD	%	97,58	97,86	98,20	98,37	98,58	98,62	98,70	98,78	98,84	98,93	98,92	98,96
COSΦ 0,9 75% LOAD	%	97,97	98,21	98,49	98,63	98,81	98,85	98,91	98,98	99,03	99,11	99,10	99,14
VOLTAGE DROP AT 75° C													
COSΦ 1 100% LOAD	%	1,96	1,76	1,50	1,37	1,23	1,2	1,14	1,09	1,05	0,96	0,98	0,95
COSΦ 0,9 100% LOAD	%	4,21	4,06	3,86	3,76	3,64	3,62	3,57	3,53	3,5	3,43	3,44	3,42
NOISE													
SOUND POWER LEVEL (LwA)	dB(A)	51	54	57	60	62	64	65	67	68	70	71	74

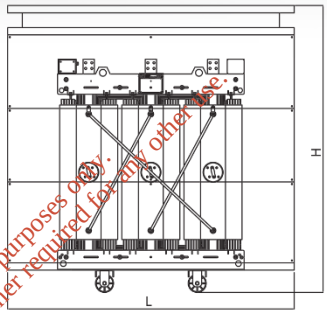
SIZES AND WEIGHTS (INDICATIVE)

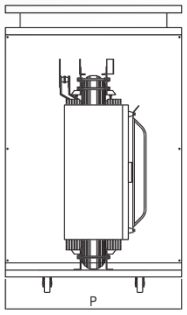
Without enclosure IP 00





With IP 31 Protective enclosure





INSULATION VOLTAGE 17,5 kV		100	160	250	400	630	800	1000	1250	1600	2000	2500	3150
LENGTH (A)	mm	1.000	1.100	1.250	1.250	1.450	1.450	1.650	1.650	1.900	1.900	1.900	2.200
DEPTH (B)	mm	650	650	650	650	800	800	1.000	1.000	1.000	1.200	1.200	1.200
HEIGHT (C)	mm	1.100	1.200	1.350	1.500	1.700	1.800	1.850	2.050	2.150	2.250	2.350	2.400
WHEEL INTERAXIS (D)	mm	520	520	520	520	670	670	820	820	820	1.000	1.000	1.000
WHEEL DIAMETER	mm	100	100	100	100	160	160	160	160	160	160	160	160
WEIGHT	kg	550	700	900	1.200	1.600	1.900	2.300	2.600	3.150	3.800	4.450	5.40

PROTECTIVE ENCLOSURE IP31		TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5
LENGTH (L)	mm	1.700	1.950	2.200	2.500	2.800
DEPTH (P)	mm	1.000	1.200	1.300	1.500	1.500
HEIGHT (H)	mm	1.850	2.000	2.400	2.650	2.900
ENCLOSURE WEIGHT	kg	220	260	320	360	400

INSULATION VOLTAGE 24 kV		100	160	250	400	630	800	1000	1250	1600	2000	2500	3150
LENGTH (A)	mm	1.100	1.150	1.250	1.450	1.450	1.450	1.650	1.650	1.900	1.900	1.900	2.200
DEPTH (B)	mm	650	650	650	800	800	800	1.000	1.000	1.200	1.200	1.200	1.200
HEIGHT (C)	mm	1.150	1.300	1.400	1.550	1.750	1.900	1.950	2.050	2.150	2.400	2.400	2.450
WHEEL INTERAXIS (D)	mm	520	520	670	670	820	820	820	820	1.000	1.000	1.000	1.000
WHEEL WIDTH	mm	40	40	40	40	50	50	50	50	50	50	50	50
WHEEL DIAMETER	mm	100	100	100	100	160	160	160	160	160	160	160	160
WEIGHT	kg	600	750	900	1.350	1.750	2.000	2.450	2.700	3.400	3.900	4.750	6.050

PROTECTIVE ENCLOSURE IP31		TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5
LENGTH (L)	mm	1700	1950	2200	2500	2.800
DEPTH (P)	mm	1000	1200	1300	1500	1.500
HEIGHT (H)	mm	1850	2000	2400	2650	2.900
ENCLOSURE WEIGHT	kg	220	260	320	360	400

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MF Trasformatori

CAST RESIN

from 100 to 3150 kVA - 17,5 – 24 kV
losses Co - Bk according to
IEC EN 50541-1

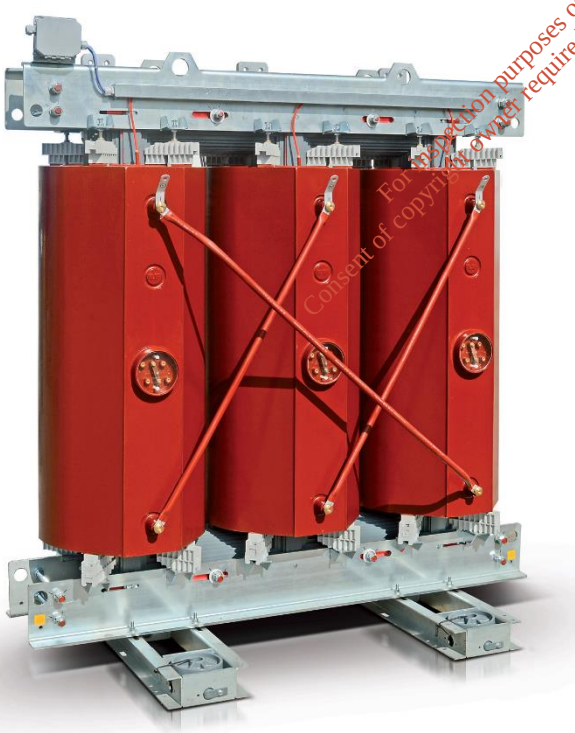
TR-PC

GENERAL INFORMATION

The new IEC EN 50541-1 has been prepared with the mission to improve the efficiency of the transformers.
This results in transformers with better efficiency which guarantee to our customers:

- savings in operating costs of the plant, due to low values of losses.
- consumption reduction of energy resources.

RATED OUTPUT kVA	100	160	250	400	630	800	1.000	1.250	1.600	2.000	2.500	3.150
EFFICIENCY AT 75°C												
COSφ 1 100% LOAD	97,79	98,04	98,35	98,52	98,70	98,74	98,82	98,88	98,94	99,02	99,00	99,04
COSφ 1 50% LOAD	98,21	98,42	98,65	98,81	98,86	99,00	99,07	99,11	99,18	99,21	99,20	99,24



PARTICULARITY

Reference norms :

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- CEI EN 50541-1

The phases of design and building, in addition to their compliance with IEC EN norms, take into account the following regulations:

- ISO 9001 : 2008 regarding the quality standards and procedures .
- ISO 14001 : 2004 regarding the environmental issues .

Easy and fast to install are suitable for use in:

- MV/LV prefabricated substation and substation with reduced dimensions.
- fire and pollution hazard areas.
- buildings with public access.

Moreover, their disposal is simple and with low environmental impact.

DESCRIPTION

The three-phase cast resin transformers have the following features:

- MV windings encapsulated in cast resin.
- LV windings impregnated with resin.

Magnetic core made using magnetic grain-oriented steel sheets with low loss, and the joints are Step-Lap inserted sheet.

- Level of partial discharges < 10 pC.
- Thermal class F – Temperature rise 100 K.
- Ambient temperature ≤ 40°C, altitude ≤ 1000 m.
- Self-extinguishing with low emission of gas, classification F1.
- Resistant to thermal shock, classification C2.
- Resistant to condensation and humidity, classification E2.

ACCESSORIES ALWAYS PROVIDED

- LV terminal connector plates
- MV voltage variation by off circuit tappings links
- Rating plate
- Lifting lugs
- 2 earthing points
- 4 bi-directional flat rollers

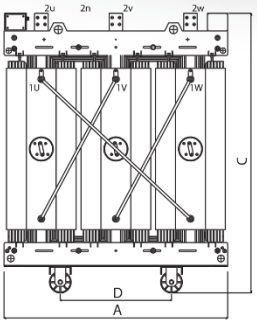
FROM 100 TO 3150 KVA 17,5 24 KV
LOSSES Co - Bk ACCORDING TO
IEC EN 505411

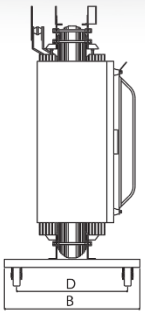
CAST RESIN
TR-PC

RATED OUTPUT kVA		100	160	250	400	630	800	1.000	1.250	1.600	2.000	2.500	3.150
NO-LOAD LOSSES	W	460	650	880	1.200	1.650	2.000	2.300	2.800	3.100	4.000	5.000	6.000
LOAD LOSSES AT 75 °C	W	1.800	2.550	3.325	4.800	6.650	8.225	9.625	11.375	14.000	15.750	20.125	24.500
LOAD LOSSES AT 120 °C	W	2.050	2.900	3.800	5.500	7.600	9.400	11.000	13.000	16.000	18.000	23.000	28.000
NO-LOAD CURRENT	%	1,4	1,4	1,2	1	0,8	0,8	0,8	0,8	0,7	0,7	0,6	0,6
IMPEDANCE VOLTAGE	%	6	6	6	6	6	6	6	6	6	6	6	6
INRUSH CURRENT IE/IN		10,5	10,5	10,50	10	10	9,5	9,5	9	9	8,5	8,5	8,5
EFFICIENCY AT 75°C													
COSΦ 1 100% LOAD	%	97,79	98,04	98,35	98,52	98,70	98,74	98,82	98,88	98,94	99,02	99,00	99,04
COSΦ 1 75% LOAD	%	98,07	98,29	98,55	98,72	98,87	98,91	98,98	99,03	99,09	99,15	99,14	99,17
COSΦ 0,9 100% LOAD	%	97,55	97,83	98,17	98,36	98,56	98,60	98,69	98,76	98,83	98,91	98,90	98,94
COSΦ 0,9 75% LOAD	%	97,87	98,11	98,40	98,58	98,75	98,79	98,87	98,92	98,99	99,06	99,04	99,08
EFFICIENCY AT 75°C													
COSΦ 1 100% LOAD	%	1,96	1,76	1,50	1,37	1,23	1,2	1,14	1,09	1,05	0,96	0,98	0,95
COSΦ 0,9 100% LOAD	%	4,21	4,06	3,86	3,76	3,64	3,62	3,57	3,53	3,5	3,43	3,44	3,42
NOISE													
SOUND POWER LEVEL (LwA)	dB(A)	59	62	65	68	70	72	73	75	76	78	81	83

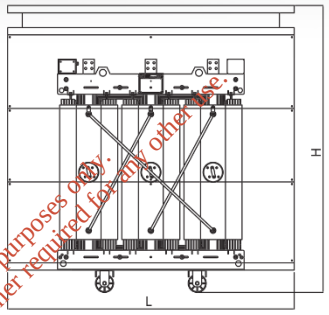
SIZES AND WEIGHTS (INDICATIVE)

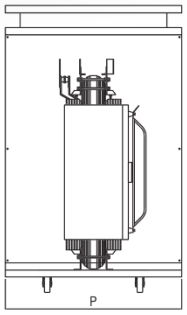
Without enclosure IP 00





With IP 31 Protective enclosure





INSULATION VOLTAGE 17,5 kV		100	160	250	400	630	800	1000	1250	1600	2000	2500	3150
LENGTH (A)	mm	1.000	1.100	1.200	1.250	1.450	1.450	1.650	1.650	1.900	1.900	1.900	2.200
DEPTH (B)	mm	650	650	650	650	800	800	1.000	1.000	1.000	1.200	1.200	1.200
HEIGHT (C)	mm	1.100	1.200	1.350	1.500	1.700	1.800	1.850	2.050	2.150	2.250	2.350	2.400
WHEEL INTERAXIS (D)	mm	520	520	520	520	670	670	820	820	820	1.000	1.000	1.000
WHEEL DIAMETER	mm	100	100	100	100	160	160	160	160	160	160	160	160
WEIGHT	kg	500	700	900	1.200	1.600	1.900	2.300	2.600	3.150	3.800	4.450	5.350

PROTECTIVE ENCLOSURE IP31		TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5
LENGTH (L)	mm	1.700	1.950	2.200	2.500	2.800
DEPTH (P)	mm	1.000	1.200	1.300	1.500	1.500
HEIGHT (H)	mm	1.850	2.000	2.400	2.650	2.900
ENCLOSURE WEIGHT	kg	220	260	320	360	400

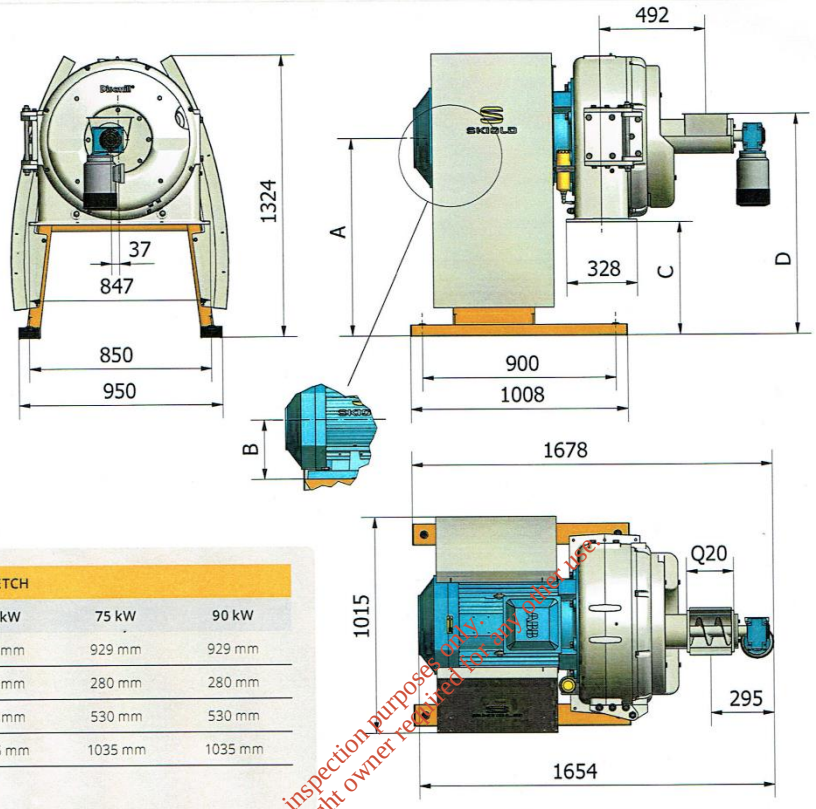
INSULATION VOLTAGE 24 kV		100	160	250	400	630	800	1000	1250	1600	2000	2500	3150
LENGTH (A)	mm	1.100	1.150	1.250	1.250	1.450	1.450	1.650	1.650	1.900	1.900	1.900	2.200
DEPTH (B)	mm	650	650	650	800	800	800	1.000	1.000	1.200	1.200	1.200	1.200
HEIGHT (C)	mm	1.150	1.300	1.400	1.550	1.750	1.900	1.950	2.050	2.150	2.400	2.400	2.450
WHEEL INTERAXIS (D)	mm	520	520	670	670	820	820	820	820	1.000	1.000	1.000	1.000
WHEEL DIAMETER	mm	100	100	100	100	160	160	160	160	160	160	160	160
WEIGHT	kg	600	750	900	1.300	1.700	2.000	2.400	2.700	3.300	3.900	4.650	5.850

PROTECTIVE ENCLOSURE IP31		TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5
LENGTH (L)	mm	1700	1950	2.200	2500	2.800
DEPTH (P)	mm	1000	1200	1.300	1500	1.500
HEIGHT (H)	mm	1850	2000	2.400	2650	2.900
ENCLOSURE WEIGHT	kg	220	260	320	360	400

MF Trasformatori
LOC. S. ANNA 22/24 - 25011 CALCINATO - BRESCIA - ITALY
TEL. +39 030 9636020-028-596 FAX +39 030 9980218
www.mftrasformatori.it - info@mftrasformatori.it

Milling Machine

SKIOLD DISC MILL SK10T



MEASURE SKETCH	55 kW	75 kW	90 kW
A	899 mm	929 mm	929 mm
B	250 mm	280 mm	280 mm
C	500 mm	530 mm	530 mm
D	1005 mm	1035 mm	1035 mm

TECHNICAL SPECIFICATIONS	
Main motor (kW):	55 / 75 / 90
Motor rotation speed (rpm):	3000
Disc diameter, external (mm):	550
Distance regulation:	Automatic
Approx. noise level (dB):	80
Weight (kg):	1100-1400
Feeding auger:	0,75
Auger rotation speed (rpm):	2800

CAPACITY			
Cereal	55 kW	75 kW	90 kW
Barley	3000-10000	4000-13000	7000-16000
Wheat	3000-12000	4000-15000	7000-18000
Maize	3000-12000	4000-15000	7000-18000
Oats	2500-9000	3000-12000	6000-14000
Peas	2500-9000	3000-12000	6000-14000

In storage dry and well cleaned crops, max. kg/h.
The capacity depends on the grinding fineness

SKIOLD SK10T DISC MILLS may be used for grinding of ordinary cleaned small-grained seed crops in storage dry condition and with a maximum diameter of 10 mm. Wheat, barley etc. can furthermore be ground from air tight silo with up to 25 % moisture content. However, please note that the capacity is reduced by approx. 5 % for each percentage of moisture content higher than 15 % - for example 18 % moisture content reduces the capacity by (18-15) x 5 = 15 %.

The disc mill is also suitable for granulation of clean pelleted feed products, and wood pellets, with a pellet diameter of up to Ø16 mm.

Data sheet. 130 986 003 118. 03. 07-09-2017.

APPENDIX E

- NOISE EQUIPMENT CALIBRATION CERTS -

Certificate of Calibration

Cirrus Research plc
dedicated to noise measurement

Equipment Details

Instrument Manufacturer	Cirrus Research Plc
Instrument Type	CR:171B
Description	Sound Level Meter
Serial Number	G071199

Calibration Procedure

The instrument detailed above has been calibrated to the publish test and calibration data as detailed in the instrument hand book, using the techniques recommended in the latest revisions of the International Standards IEC 61672-1:2013, IEC 61672-1:2002, IEC 60651:1979, IEC 60804:2001, IEC 61260:1995, IEC 60942:2003, IEC 60942:1997, IEC 61252:1993, ANSI S1.4-1983, ANSI S1.11-1986 and ANSI S1.43-1997 where applicable.
Sound Level Meters: All Calibration procedures were carried out by substituting the microphone capsule with a suitable electrical signal, apart from the final acoustic calibration.

Calibration Traceability

The equipment detailed above was calibrated against the calibration laboratory standards held by Cirrus Research plc. These are traceable to International Standards {A.0.6}. The standards are:

Microphone Type	GRAS 40AP	Serial Number	173198	Calibration Ref.	0170
Calibrator Type	B&K 4231	Serial Number	2564324	Calibration Ref.	A1914
Calibrator Type	B&K 4231	Serial Number	2564325	Calibration Ref.	A1915
Calibrator Type	B&K 4231	Serial Number	2594796	Calibration Ref.	A1916

Calibrated by

Calibration Date 8 July 2019
Calibration Certificate Number 22682

Cirrus Research plc, Acoustic House, Bridlington Road, Hunmanby, North Yorkshire, YO14 0PH
Telephone: +44 (0) 1723 891655 Fax: +44 (0) 1723 891742
Email: sales@cirrusresearch.co.uk

Certificate of Calibration

Certificate Number: **130782**
Date of Issue: **18 July 2019**

Instrument

Manufacturer: **Cirrus Research plc** Serial Number: **54060**
Model Number: **CR:515**

Calibration Procedure

The sound calibrator detailed above has been calibrated to the published data as described in the operating manual and in the half-inch configuration. The procedures and techniques used are as described in IEC 60942:2003 Annex B – Periodic Tests and three determinations of the sound pressure level, frequency and total distortion were made.

The sound pressure level was measured using a WS2F condenser microphone type MK:224 manufactured by Cirrus Research plc.

The results have been corrected to the reference pressure of 101.33 kPa using the manufacturer s data.

Date of Calibration: **18 July 2019**

Calibration Results

Measurement	Level (dB)	Frequency (Hz)	Distortion (% THD + Noise)
1	93.99	1000.0	0.26
2	93.98	1000.0	0.25
3	93.98	1000.0	0.25
Average	**93.98**	**1000.0**	**0.25**
Uncertainty	± 0.11	± 0.14	± 0.10

The reported uncertainties of measurement are expanded by a coverage factor of k=2, providing a 95% confidence level.

Cirrus Research plc, Acoustic House, Bridlington Road
Hunmanby, North Yorkshire, YO14 0PH, United Kingdom
Telephone: 0845 230 2434 **Int**: +44 1723 891655
Email: sales@cirrusresearch.co.uk
Web: www.cirrusresearch.co.uk
UK Registration No. 987160

bsi. ISO 9001:2015 Quality Management FM 531001 ISO 14001 Environmental Management EMS 552104

CERTIFICATE OF CALIBRATION

ISSUED BY **Cirrus Research plc**

DATE OF ISSUE **18/07/19** CERTIFICATE NUMBER **130781**

Cirrus Research plc
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Test engineer:
D.Swalwell
Electronically signed:

Microphone

Microphone capsule

Manufacturer: Cirrus Research plc

Model: MK:224

Serial Number: 203537A

Calibration procedure

Date of calibration: 16 July 2019

Open circuit: 52.7 mV/Pa

Sensitivity at 1 kHz: -25.6 dB rel 1 V/Pa

The microphone capsule detailed above has been calibrated to the published data as described in the operating manual of the associated sound level meter (where applicable).

The frequency response was measured using an electrostatic actuator in accordance with BS EN 61094-6:2005 with the free-field response derived via standard correction data traceable to a National Measurement Institute.

The absolute sensitivity at 1 kHz was measured using an acoustic calibrator conforming to IEC 60942:2003 Class 1.

Environmental conditions

Pressure: 101.10 kPa

Temperature: 21.0 °C

Humidity: 58.0 %

Panther Environmental Solutions Ltd
Units 3 & 4, Innovation Centre
Institute of Technology
Green Road, Carlow
Ireland
R93 W248

Telephone: 059-9134222
Email: info@pantherwms.com
Website: www.pantherwms.com

ENVIRONMENTAL NOISE IMPACT ASSESSMENT REPORT

(SUPPLEMENTARY)

BALLYFASKIN ENTERPRISES LTD
BALLYFASKIN, BALLYLANDERS,
CO. LIMERICK

2020

REPORT NO:	ENA_20_9886	**AUTHOR:**	Martin O'Looney, BSc.
DATE:	28th September 2020	**REVIEWED:**	Mike Fraher, BSc.

TABLE OF CONTENTS

LIST OF TABLES & FIGURES

1.0 INTRODUCTION & SCOPE OF REPORT

This report provides a supplementary assessment to a Noise Impact Assessment completed by PES on 3rd March 2020 (Report Ref: ENA_20_9668). This report should be read in conjunction with that original report, and includes;

- an impact assessment of noise from the proposed transformer on additional noise sensitive receptors and,
- A Noise Management Plan for the farm.

Ballyfaskin Enterprises Ltd, whom operate a pig rearing facility at Ballyfaskin, Ballylanders, Co. Limerick, are seeking permission (Planning Ref:191135) from Limerick Co Co to increase the capacity of the piggery from 600 sows to 1000 sows and their progeny and the construction of a new electrical substation.

The only construction which would occur would be a new electrical substation, which would be constructed to ESB / best practice standards.

The original March 2020 noise report should be consulted for the background legislation, guidance, measurement parameters and terminology, baseline noise survey methods and figures used in this supplementary report.

The original report and this supplementary report assess noise in accordance with the methodology specified in the 'BS4142 (2014) – *Method for Rating Industrial Noise Affecting Mixed Residential and Industrial Areas'* as published by The British Standards Institution in 2014 and EPA (2016) – '*Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)'.*

2.0 METHODOLOGY

2.1 NOISE PREDICTION METHODOLOGY

BS EN ISO 9613-2:1996 Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation

The noise prediction methodology used in this report is based upon the international standard ISO 9613-2 "*Attenuation of Sound during Propagation Outdoors*". This standard outlines a method for calculating the attenuation of sound during propagation outdoors in order to predict the levels of environmental noise at a distance from a variety of sources.

The central formula for this calculation is as follows:

$$\mathbf{A = A_{div} + A_{gr} + A_{bar} + A_{misc}}$$

Where:
A is the attenuation due to site conditions
A_{div} is the attenuation due to the geometrical divergence (distance from source)
A_{gr} is the attenuation due to the ground effect
A_{bar} is the attenuation due to a barrier
A_{misc} is the attenuation due to miscellaneous other effects as appropriate

This attenuation factor is then subtracted from the predicted operational noise at the proposed activity. The resultant figure is the predicted noise from the proposed activity at a given noise sensitive location.

This figure may then be added logarithmically to the existing background noise at the noise sensitive location to attain the predicted noise level if the proposed activity were to begin.

Relevant Formulae

In order to carry out this predictive analysis, the following attenuation characteristics have been taken into account:

Divergence – A_{div}
The geometrical divergence accounts for the spherical spreading in the free field from the point sound source, causing attenuation due to the inverse square law. Divergence is calculated as follows:

$$\mathbf{A_{div} = 20.log_{10} (d/d_o) + Q}$$

Where:
d is the distance from the source to the receiver (m)
d_o is the reference distance (1 m)
Q is a constant relating the sound power level to the sound pressure level at a reference distance d_0 which is 1 meter from a point source.

When a directivity factor is included, this attenuation figure converts the source Sound Power Level (L_W) to Sound Pressure Level (Lp). The calculation is frequency independent, therefore if the source noise is presented as A-weighted, the resulting receptor noise is also A-weighted.

BS EN ISO 12354-4:2017 Building acoustics - Estimation of acoustic performance of buildings from the performance of elements - Part 4: Transmission of indoor sound to the outside

ISO 12354-4:2017 specifies a calculation model to estimate the sound power level radiated by the envelope of a building due to airborne sound inside that building.

The method defines the sound power level (L_W) of a calculated substitute point source for noise break out from the building elements and openings in a building.

Annex F of BS12354-4 provides a method for estimating the A-weighted Sound Power Level (L_{WA}) of a substitute point source at the façade of a building where the single figure internal A-weighted Sound Pressure Level (L_{pA}) and single figure Sound Reduction Indices (Rw / Dn,e,w) of building elements are known.

The following formulas from Annex F of BS12354-4 are used to determine the Sound Power Level (L_{WA}):

$$L_{WA} = L_{pA,in} - 6 - X'_{As} + 10 \lg \frac{S}{S_o} \quad \text{(F.1)}$$

where

$L_{pA,in}$	is the A-weighted sound pressure level at 1 m to 2 m from the inside of segment j, in decibels;
X'_{As}	is the quantity characterizing the A-weighted sound level difference over segment j for source spectrum *s*, in decibels;
S	is the area of segment j, in square metres;
S_o	is the reference area, in square metres; S_o = 1 m².

$$X'_{As} = -10 \lg \left(\sum_{i=1}^{m} \frac{S_i}{S} 10^{-\left(R_{w,i} + C_{s,i}\right)/10} + \sum_{i=1}^{m} \frac{A_o}{S} 10^{-\left(D_{n,e,w,1} + C_{s,i}\right)/10} \right) \quad \text{(F.2)}$$

where

$R_{w,i}$	is the weighted sound reduction index of element i, in decibels;
$D_{n,e,w,i}$	is the weighted element normalized level difference of a small element i, in decibels;
$C_{s,i}$	is the spectrum adaptation term for spectrum s of element i, in decibels;
S_i	is the area of element i, in square metres;
A_o	is the reference absorption area, in square metres; A_o = 10 m²;
m	is the number of large elements of the segment;
n	is the number of small elements of the segment.

The sound pressure level at a reception point outside the building is determined from the contributions of each substitute point source according to:

$$L_p = L_W + D_c - A_{tot} \quad (1)$$

where

L_p	is the sound pressure level at a reception point outside the building due to the sound radiation of a substitute point source, in decibels;
L_W	is the sound power level of the substitute point source, in decibels;
D_c	is the directivity correction for the substitute point sources in the direction of the reception point, in decibels;
A_{tot}	is the total attenuation that occurs during sound propagation from the substitute point source to the reception point, in decibels.

Note: In this assessment, the directivity correction (Dc / Q) has been incorporated into the Atot figure, in compliance with BS 9613-2.

2.2 NOISE SOURCE SPECIFICATION

2.2.1 Electrical Substation

The only construction and new equipment which would occur as a result of the proposed development would be the installation of an ESB Sub-station at the site.

The model of the transformer has not been chosen as yet, however, it would be chosen from the list provided in **Appendix B** of this report. The specified sound power level (LwA) ratings for this equipment range from 51 dB to 83 dB.

The maximum LwA 83 dB (LpA 72 dB) rated transformer has been chosen for this assessment.

The transformer would be enclosed within the proposed sub-station building, as defined within the drawings submitted with the planning application. The construction of the walls of the building would be a concrete block cavity wall, with a 450mm inner leaf, 200mm cavity and 230mm outer leaf, plastered outer leaf.

No sound reduction index (Rw) could be found for this construction, and a reduction index for a similar construction of Rw 55 dB (100mm-75mm-100mm cavity wall, 13mm plaster both sides) has been used. As this construction would be of a lower mass than the proposed construction, it is anticipated that predicted noise impact levels will be over-estimated.

2.3 LOCATION OF NOISE IMPACT ASSESSMENT

The facility is located in an area rural in character with residences in the area predominantly linearly aligned along the existing road network.

We have been requested to provide additional noise impact assessment with regard to transformer noise at residences in close proximity to the western boundary of the farm, as follows:

Table 2.1: Noise Sensitive Receptors

Ref. No.	Grid Ref	Location Type	Location
NSR2	178883, 123407	Noise Sensitive Receptor	Residence *c.*80m west of the proposed transformer.
NSR3	178853, 123445	Noise Sensitive Receptor	Residence *c.*115m north of the proposed transformer.

These noise sensitive receptor locations will be used to predict the resultant noise levels at the residences from the proposed transformer, in the context of existing background noise levels in the area.

Baseline noise monitoring was carried out in general accordance with the British Standard EN BS 4142 '*Method for Rating Industrial Noise Affecting Mixed Residential and Industrial Areas*'.

Detailed results of the baseline noise assessment may be found in the original March 2020 noise impact assessment report. The daytime monitoring was carried out between 11:17am and 18:06pm on Wednesday 5th February 2020, while night-time monitoring was carried out between 21:58pm on Wednesday 5th February and 01:25am Thursday 6th February 2020.

Background noise levels were determined at the following location:

Table 2.2: Noise Monitoring Locations

Ref. No.	Grid Ref	Location Type	Location
BG1	179167,124318	Background Noise Monitoring	Gateway on R662 road *c.*880m North of the Site Boundary

Grid Ref Source: http://irish.gridreferencefinder.com

All measurements were taken at:

- 1.2 – 1.5 metres height above local ground level
- 1.0 – 5.0 metres away from reflective surfaces

These locations are mapped in **Appendix A**.

3.0 RESULTS

3.1 BACKGROUND NOISE LEVELS - RESULTS

Definition:
A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels.

In order to determine the Background (L_{90}) noise levels at the closest noise sensitive receptors, monitoring was carried out at locations that represent the noise level that would be experienced at the NSR's in the absence of facility related noise.

BS4142:2014 guidance recommends a 60-minutes monitoring period during the day from 07:00 - 23:00 and a shorter monitoring period of 15-minutes at night from 23:00 - 07:00. For this assessment the following reference time intervals were used to measure the ambient noise levels:

- 60-minutes duration during the daytime hours.
- 30-minutes duration during the night-time hours.

Table 3.1: Measured Background Noise Levels

Ref	Location	Time	L_{Aeq}	L_{A10}	L_{A90}
Daytime					
BG1	Gateway *c.*880m North of the Site Boundary	11:17	62	55	**35**
Night-time					
BG1	Gateway *c.*880m North of the Site Boundary	21:58	58	42	**28**

3.2 PREDICTIVE NOISE ASSESSMENT - RESULTS

In order to determine the potential impact of noise from the proposed changes at the farm, the resultant noise levels at noise sensitive receptors have been calculated.

3.2.1 Prediction of Electric Sub-station Noise

It is assumed that the rear gable of the electric sub-station would face towards the north.

	Width (m)	Height (m)	Number (#)	S (m^2)
Gable Wall	4.000	2.715	1	10.860
			S (wall)	**10.860**
			S (total)	**10.860**

The following table determines the A-weighted sound level difference for the segment:

Attenuation Calculation	Concrete
Rw / Dn,e,w	55
Cs	0
Si	10.860
S	10.860
A_0	-
(Si/S)*(10^-((Rw+Cs)/10))	3.16E-06
(A_0/S)*(10^-((Dn,e,w+Cs)/10))	
X'As	**55.00**

The following table determines the A-weighted Sound Power Level (L_{WA}) of a substitute point source on the façade segment as per formula 1 above:

Table 3.2: Electric Substation Source Noise	
Substitute Point Source	**Values**
LpA, in (dB)	72
Diffusivity Term (Cd)	-6
X'As	55.00
S	10.86
S_0	1
L_{WA} (dB)	**21.36**

3.2.2 Prediction of Noise Levels at Receptor Façade

The equivalent external sound power level for substation noise has been calculated in **section 3.2.1**.

The following table determines the equivalent sound pressure level (LpA) of sub-station noise at the nearest receptor, based upon the formula for divergence between the source and receptor.

Lp = Lw-20Log(d/d0)-Q factor

Table 3.3: Predicted Sound Pressure Levels (LpA) at Receptors		
Sound Pressure Level at Receptor	**NSR2**	**NSR3**
L_{WA} (dB)	**21**	**21**
distance (m)	**80**	**115**
Q factor (dB)*	**8**	**8**
20Log(d) (dB)	**38**	**41**
Atotal (Adiv + Q)	**46**	**49**
L_{pA} (dB) at NSR1	**<0**	**<0**

* Directivity factor (whole sphere = 11 dB, half sphere = 8 dB, quarter sphere = 5 dB)

The methodology outlined in BS4142 requires that predicted noise levels be compared to existing L_{90} figures at noise sensitive locations in order to determine the likely noise impact. The BS4142 assessment has been carried out in the following section.

A noise character penalty of +5 has been applied to noise levels in order to account for potential subjective annoyance factors for noise sources.

The following tables determine the likelihood of noise impacts at the noise sensitive receptor following the BS4142 methodology:

Table 3.4: BS4142 Noise Assessment NSR2

Source	Background Noise (L_{90})	Predicted Noise			Difference from Background
		Predicted Noise	Predicted Penalty	Rating Level	
Daytime					
Sub-Station	35	0	-	0	-35
Night-time					
Sub-Station	28	0	-	0	-28

Table 3.5: BS4142 Noise Assessment NSR3

Source	Background Noise (L_{90})	Predicted Noise			Difference from Background
		Predicted Noise	Predicted Penalty	Rating Level	
Daytime					
Sub-Station	35	0	-	0	-35
Night-time					
Sub-Station	28	0	-	0	-28

4.0 DISCUSSION

4.1 GENERAL DISCUSSION

Baseline noise monitoring was carried out in general accordance with the British Standard EN BS 4142 '*Method for Rating Industrial Noise Affecting Mixed Residential and Industrial Areas*'.

Noise levels at the background noise monitoring location (BG1) (site noise absent) was determined to be L_{A90} 35 dB during the daytime and L_{A90} 28 dB during night-time monitoring.

Noise at the background monitoring location was found to be characterised by distant low traffic noise and noise from wind in trees. Intermittent noise from traffic passing on the R662 and birds singing also added to background noise levels.

The noise limits defined in the sites EPA IE licence (Ref: P0915-01) apply at noise sensitive receptor locations.

Condition 4.1 and Schedule B.4 of the sites licence establish noise limits to which the site must comply, as follows:

Condition 4.1 Noise
Noise from the installation shall not give rise to sound pressure levels ($L_{Aeq, T}$) measured at the noise sensitive locations of the installation which exceed the limit value(s).

Schedule B.4 Noise Emission Limits

Daytime dB $L_{Ar,T}$ (30 minutes)	**Daytime dB $L_{Ar,T}$ (30 minutes)**	**Daytime dB $L_{Aeq,T}$ (15-30 minutes)**
55	50	45

Note 1: There shall be no clearly audible tonal component or impulsive component in the noise emission from the activity at any noise- sensitive location.

4.2 BS4142:2014 IMPACT ASSESSMENT

A BS4142 has been completed on the potential noise impacts which may occur as a result of the proposed permission (Planning Ref:191135) from Limerick Co Co to increase the capacity of the piggery from 600 sows to 1000 sows and their progeny and the construction of a new electrical substation.

BS4142 infers that for a given excess of the rating level over the background level, the impacts and potential likelihood of complaints are as follows:

Excess	Likelihood of Complaints	Interpretation of Impact
≥ 10dB	Likely	An indication of a significant adverse impact.
> 5dB	Possible	An indication of an adverse impact.
≤ 5 dB	Unlikely	An indication that it is unlikely that the specific sound source will have an adverse impact or a significant adverse impact.
< 0dB	Very Unlikely	An indication that the specific sound source will have a low impact.

Adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact.

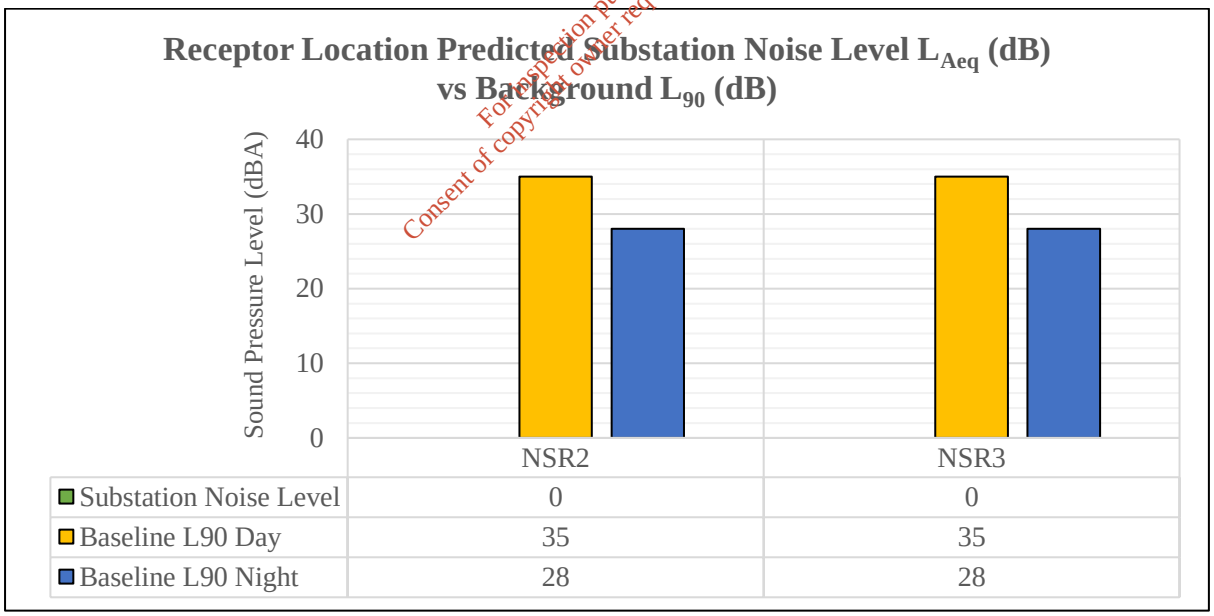


Figure 4.1: Background Noise L_{90} vs Predicted Noise Levels at Receptors

It should be noted that predicted noise levels only consider divergence, as this would be the primary parameter influencing noise between the source and receptor. Other parameters which would contribute the reduction of sound such as ground absorption, absorption by vegetation or existing barriers or buildings have not been considered. Therefore, this may be considered a worst case scenario for noise from the proposed sub-station.

The predicted noise level at receptor locations for the Electric Substation was found to be less than 0 dB at NSR2 and NSR3.

The predicted noise level at the substitute point source at the sub-station building façade, before the noise travels offsite, was calculated to be Lw 21 dBA (Lp 13 dBA) which is below the recorded day-time and night-time background noise levels for the area.

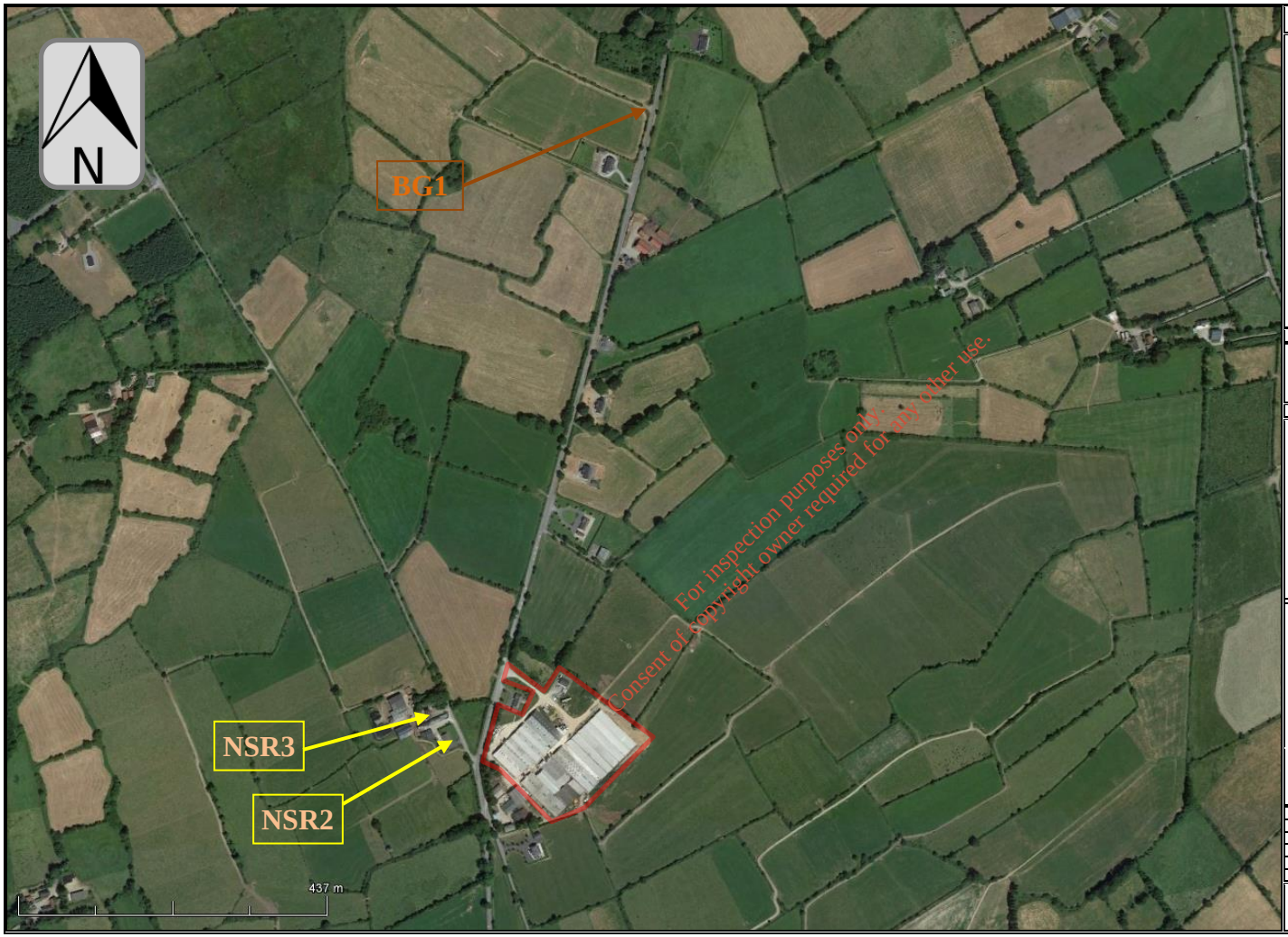
As a result of the substation house construction materials, the noise level outside the substation building is predicted to be greater than 10 dB below the background daytime and night-time L_{90}. Therefore, the substation noise would be anticipated to be inaudible within the farm boundary. It should be noted that the construction material noise reduction indices used in this assessment are anticipated to be less than the expected noise reduction figures of the proposed substation building (see **section 2.2.1**).

Therefore, there is not anticipated to be any potential for noise impacts as a result of the proposed sub-station at noise sensitive locations.

APPENDIX A

- SITE MAPS WITH MONITORING POINTS -

APPENDIX A: NOISE ASSESSMENT LOCATIONS



Notes

– Boundary of Premises

Project Title:

Location Map 1

Client Name:

BALLYFASKIN ENTERPRISES LTD, BALLYFASKIN, BALLYLANDERS, CO. LIMERICK

PANTHER ENVIRONMENTAL SOLUTIONS LTD

UNITS 3 & 4
INNOVATION CENTRE
GREEN ROAD
CARLOW
R93 W248

TELE: 059 91 34222
MOBILE: 087 851 9284
EMAIL:info@pantherwms.com
WEB: www.pantherwms.com

Drawing Status:	**Scale:**	NTS	A4
Report	**Datum:**	Google Pro	
Drawing Number:	**Drawn:**	MOL	
D9886-01	**Checked:**	MF	
Revision:	**Approved:**	-	
R0	**Date:**	25/09/2020	

APPENDIX B

- SUBSTATION NOISE SPECIFICATIONS -

Electrical Sub-Station

Green efficiency

MF Trasformatori

CAST RESIN

TR-PA

from 100 to 3150 kVA - 17,5 – 24 kV
losses Ao - Ak according to
IEC EN 50541-1

GENERAL INFORMATION

At present, the improvement of the energy efficiency cannot be considered a slogan anymore, but a need of our time. TR-PA series high efficiency transformers are created for this purpose guaranteeing:

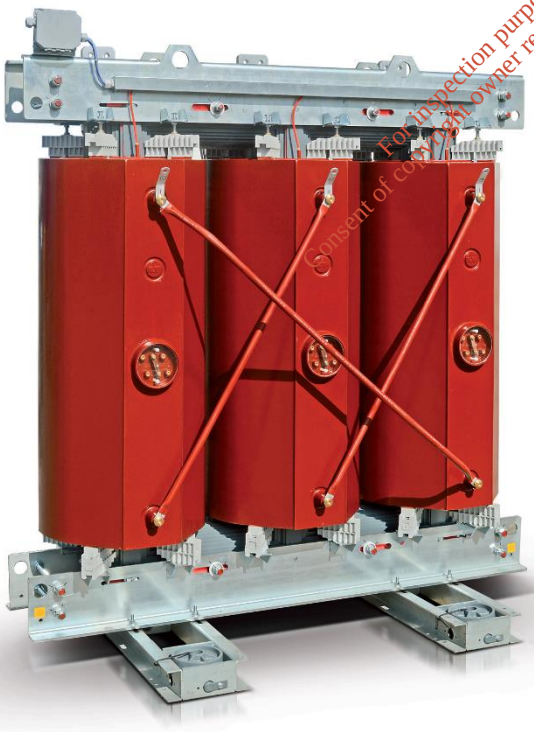
- savings in operating costs of the plant, due to low values of losses.
- consumption reduction o f energy resources.
- reduction of CO_2 emissions.

A
B
C
Ao Ak

ANNUAL SAVINGS (MAXIMUM) COMPARED TO TRANSFORMERS WITH LOSSES, ACCORDING TO HD 538.1 / HD 538.2

RATED OUTPUT kVA	100	160	250	400	630	800	1.000	1.250	1.600	2.000	2.500	3.150
LOW CONSUMPTION (MWh)	3,8	5,3	6,7	12,7	9,2	18,4	24,1	26,3	34,2	29,8	51,7	71,8
LOW EMISSIONS CO_2 (T)	2,8	3,9	5,0	9,5	6,9	13,8	18,1	19,7	25,6	22,3	38,8	53,9
ENERGY SAVINGS TOE *	0,7	1,0	1,2	2,4	1,7	3,4	4,5	4,9	6,4	5,6	9,7	13,4

* TONNE OF OIL EQUIVALENT



PARTICULARITY

Reference norms :

- CEI EN 60067-1,2,3,4,5 -11
- CEI EN 50541-1

The phases of design and building, in addition to their compliance with IEC EN norms, take into account the following regulations:

- ISO 9001 : 2008 regarding the quality standards and procedures .
- ISO 14001 : 2004 regarding the environmental issues .

Easy and fast to install are suitable for use in:

- MV/LV prefabricated substation and substation with reduced dimensions.
- fire and pollution hazard areas.
- buildings with public access.

Moreover, their disposal is simple and with low environmental impact.

DESCRIPTION

The three-phase cast resin transformers have the following features:

- MV windings encapsulated in cast resin.
- LV windings impregnated with resin.

Magnetic core made using magnetic grain-oriented steel sheets with low loss, and the joints are Step-Lap inserted sheet.

- Level of partial discharges < 10 pC.
- Thermal class F – Temperature rise 100 K.
- Ambient temperature ≤ 40°C, altitude ≤ 1000 m.
- Self-extinguishing with low emission of gas, classification F1.
- Resistant to thermal shock, classification C2.
- Resistant to condensation and humidity, classification E2.

COMPLETION ACCESSORIES ALWAYS PROVIDED

- LV terminal connector plates
- MV voltage variation by off circuit tappings links
- Rating plate
- Lifting lugs
- 2 earthing points
- 4 bi-directional flat rollers

FROM 100 TO 3150 KVA 17,5 24 KV
LOSSES Ao - Ak ACCORDING TO
IEC EN 50541 1

Green efficiency

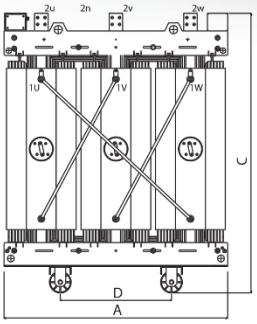
CAST RESIN

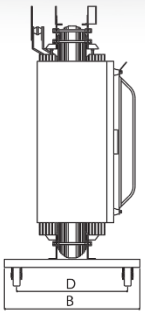
TR-PA

RATED OUTPUT kVA		100	160	250	400	630	800	1.000	1.250	1.600	2.000	2.500	3.150
NO-LOAD LOSSES	W	280	350	520	750	1.100	1.300	1.550	1.800	2.200	2.600	3.100	3.800
LOAD LOSSES AT 75 °C	W	1.575	2.275	2.975	3.950	6.200	7.000	7.875	9.625	11.375	14.000	16.625	19.250
LOAD LOSSES AT 120 °C	W	1.800	2.600	3.400	4.500	7.100	8.000	9.000	11.000	13.000	16.000	19.000	22.000
NO-LOAD CURRENT	%	1	0,9	0,8	0,8	0,8	0,6	0,6	0,6	0,6	0,6	0,4	0,4
IMPEDANCE VOLTAGE	%	6	6	6	6	6	6	6	6	6	6	6	6
INRUSH CURRENT IE/IN		11,5	10,5	10,00	9,5	9,5	9	9	8,5	8,5	8	8	7,5
EFFICIENCY AT 75°C													
COSΦ 1 100% LOAD	%	98,15	98,36	98,60	98,83	98,84	98,96	99,06	99,09	99,15	99,17	99,21	99,27
COSΦ 1 75% LOAD	%	98,45	98,65	98,83	99,01	99,03	99,13	99,20	99,23	99,28	99,30	99,34	99,38
COSΦ 0,9 100% LOAD	%	97,90	98,14	98,41	98,67	98,68	98,82	98,93	98,96	99,04	99,06	99,10	99,17
COSΦ 0,9 75% LOAD	%	98,25	98,47	98,68	98,88	98,90	99,01	99,10	99,13	99,19	99,21	99,25	99,30
EFFICIENCY AT 75°C													
COSΦ 1 100% LOAD	%	1,74	1,59	1,36	1,16	1,16	1,05	0,96	0,95	0,89	0,88	0,84	0,79
COSΦ 0,9 100% LOAD	%	4,04	3,93	3,75	3,59	3,59	3,5	3,43	3,41	3,36	3,36	3,33	3,28
NOISE													
SOUND POWER LEVEL (LwA)	dB(A)	51	54	57	60	62	64	65	67	68	70	71	74

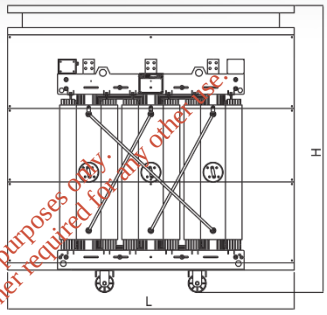
SIZES AND WEIGHTS (INDICATIVE)

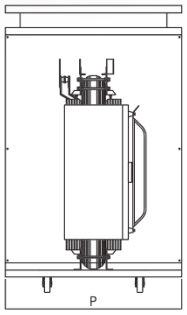
Without enclosure IP 00





With IP 31 Protective enclosure





INSULATION VOLTAGE 17,5 kV		100	160	250	400	630	800	1000	1250	1600	2000	2500	3150
LENGTH (A)	mm	1.000	1.100	1.250	1.450	1.450	1.650	1.650	1.650	1.900	1.900	1.900	2.200
DEPTH (B)	mm	650	650	650	800	800	1.000	1.000	1.000	1.200	1.200	1.200	1.200
HEIGHT (C)	mm	1.150	1.250	1.350	1.500	1.700	1.800	1.900	2.050	2.150	2.250	2.350	2.550
WHEEL INTERAXIS (D)	mm	520	520	520	670	670	820	820	820	1.000	1.000	1.000	1.000
WHEEL DIAMETER	mm	100	100	100	100	160	160	160	160	160	160	160	160
WEIGHT	kg	600	750	1.000	1.400	1.750	2.150	2.550	2.900	3.400	3.900	4.750	6.100

PROTECTIVE ENCLOSURE IP31		TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5
LENGTH (L)	mm	1.700	1.950	2.200	2.500	2.800
DEPTH (P)	mm	1.000	1.200	1.300	1.500	1.500
HEIGHT (H)	mm	1.850	2.000	2.400	2.650	2.900
ENCLOSURE WEIGHT	kg	220	260	320	360	400

INSULATION VOLTAGE 24 kV		100	160	250	400	630	800	1000	1250	1600	2000	2500	3150
LENGTH (A)	mm	1.100	1.150	1.250	1.450	1.650	1.650	1.650	1.900	1.900	1.900	1.900	2.200
DEPTH (B)	mm	650	650	650	800	1.000	1.000	1.000	1.200	1.200	1.200	1.200	1.200
HEIGHT (C)	mm	1.200	1.350	1.400	1.550	1.750	1.850	1.950	2.050	2.150	2.250	2.400	2.550
WHEEL INTERAXIS (D)	mm	520	520	670	670	820	820	820	1.000	1.000	1.000	1.000	1.000
WHEEL DIAMETER	mm	100	100	100	100	160	160	160	160	160	160	160	160
WEIGHT	kg	700	850	1.150	1.600	1.900	2.350	2.750	3.100	3.700	4.400	5.250	6.250

PROTECTIVE ENCLOSURE IP31		TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5
LENGTH (L)	mm	1700	1950	2200	2500	2.800
DEPTH (P)	mm	1000	1200	1300	1500	1.500
HEIGHT (H)	mm	1850	2000	2400	2650	2.900
ENCLOSURE WEIGHT	kg	220	260	320	360	400

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WE SUPPORT

Green efficiency

MF Trasformatori

from 100 to 3150 kVA - 17,5 – 24 kV
losses Bo - Bk according to
IEC EN 50541-1

CAST RESIN

TR-PB

GENERAL INFORMATION

At present, the improvement of the energy efficiency cannot be considered a slogan anymore, but a need of our time.
TR-PB series high efficiency transformers are created for this purpose guaranteeing:

- savings in operating costs of the plant, due to low values of losses.
- consumption reduction of energy resources.
- reduction of CO_2 emissions.

ANNUAL SAVINGS (MAXIMUM) COMPARED TO TRANSFORMERS WITH LOSSES, ACCORDING TO HD 538.1 / HD 538.2

RATED OUTPUT KVA	100	160	250	400	630	800	1.000	1.250	1.600	2.000	2.500	3.150
LOW CONSUMPTION (MWh)	1,4	1,5	2,0	2,3	3,5	4,4	4,4	6,1	6,1	8,8	12,3	14,9
LOW EMISSIONS CO_2 (T)	0,7	1,1	1,5	1,7	2,6	3,3	3,3	4,6	4,6	6,6	9,2	11,2
ENERGY SAVINGS TOE *	0,2	0,3	0,4	0,5	0,7	0,8	0,8	1,2	1,2	1,6	2,3	2,8

*TONNE OF OIL EQUIVALENT

PARTICULARITY

Reference norms :
- CEI EN 60067-1,2,3,4,5 -11
- CEI EN 50541-1

The phases of design and building, in addition to their compliance with IEC EN norms, take into account the following regulations:
- ISO 9001 : 2008 regarding the quality standards and procedures .
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Easy and fast to install are suitable for use in:
- MV/LV prefabricated substation and substation with reduced dimensions.
- fire and pollution hazard areas.
- buildings with public access.

Moreover, their disposal is simple and with low environmental impact.

DESCRIPTION

The three-phase cast resin transformers have the following features:
- MV windings encapsulated in cast resin.
- LV windings impregnated with resin.

Magnetic core made using magnetic grain-oriented steel sheets with low loss, and the joints are Step-Lap inserted sheet.
- Level of partial discharges < 10 pC.
- Thermal class F – Temperature rise 100 K.
- Ambient temperature ≤ 40°C, altitude ≤ 1000 m.
- Self-extinguishing with low emission of gas, classification F1.
- Resistant to thermal shock, classification C2.
- Resistant to condensation and humidity, classification E2.

ACCESSORIES ALWAYS PROVIDED

- LV terminal connector plates
- MV voltage variation by off circuit tappings links
- Rating plate
- Lifting lugs
- 2 earthing points
- 4 bi-directional flat rollers

FROM 100 TO 3150 KVA 17,5 24 KV
LOSSES Bo - Bk ACCORDING TO
IEC EN 505411

Green efficiency

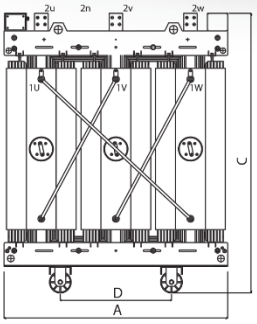
CAST RESIN

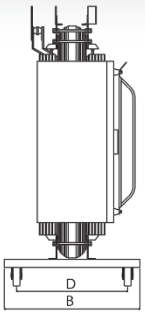
TR-PB

RATED OUTPUT kVA		100	160	250	400	630	800	1.000	1.250	1.600	2.000	2.500	3.150
NO-LOAD LOSSES	W	340	480	650	940	1250	1.500	1.800	2.100	2.400	3.000	3.600	4.300
LOAD LOSSES AT 75 °C	W	1.800	2.550	3.325	4.800	6.650	8.225	9.625	11.375	14.000	15.750	20.125	24.500
LOAD LOSSES AT 120 °C	W	2.050	2.900	3.800	5.500	7.600	9.400	11.000	13.000	16.000	18.000	23.000	28.000
NO-LOAD CURRENT	%		1,2	1,4	1	0,8	0,8	0,8	0,8	0,6	0.8	0,6	0,6
IMPEDANCE VOLTAGE	%	6	6	6,00	6	6	6	6	6	6	6	6	6
INRUSH CURRENT IE/IN		12,3	12,9	12,00	11,8	11	9,6	9,4	9,2	9	8,8	8,8	8,4
EFFICIENCY AT 75°C													
COSΦ 1 100% LOAD	%	97,87	98,11	98,41	98,57	98,75	98,79	98,86	98,92	98,98	99,06	99,05	99,09
COSΦ 1 75% LOAD	%	98,20	98,41	98,66	98,79	98,95	98,98	99,04	99,10	99,15	99,21	99,21	99,24
COSΦ 0,9 100% LOAD	%	97,58	97,86	98,20	98,37	98,58	98,62	98,70	98,78	98,84	98,93	98,92	98,96
COSΦ 0,9 75% LOAD	%	97,97	98,21	98,49	98,63	98,81	98,85	98,91	98,98	99,03	99,11	99,10	99,14
VOLTAGE DROP AT 75° C													
COSΦ 1 100% LOAD	%	1,96	1,76	1,50	1,37	1,23	1,2	1,14	1,09	1,05	0,96	0,98	0,95
COSΦ 0,9 100% LOAD	%	4,21	4,06	3,86	3,76	3,64	3,62	3,57	3,53	3,5	3,43	3,44	3,42
NOISE													
SOUND POWER LEVEL (LwA)	dB(A)	51	54	57	60	62	64	65	67	68	70	71	74

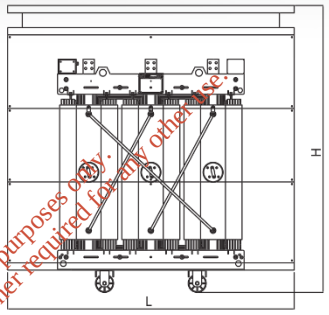
SIZES AND WEIGHTS (INDICATIVE)

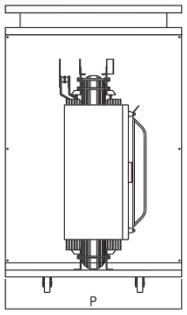
Without enclosure IP 00





With IP 31 Protective enclosure





INSULATION VOLTAGE 17,5 kV		100	160	250	400	630	800	1000	1250	1600	2000	2500	3150
LENGTH (A)	mm	1.000	1.100	1.350	1.250	1.450	1.450	1.650	1.650	1.900	1.900	1.900	2.200
DEPTH (B)	mm	650	650	650	650	800	800	1.000	1.000	1.000	1.200	1.200	1.200
HEIGHT (C)	mm	1.100	1.200	1.350	1.500	1.700	1.800	1.850	2.050	2.150	2.250	2.350	2.400
WHEEL INTERAXIS (D)	mm	520	520	520	520	670	670	820	820	820	1.000	1.000	1.000
WHEEL DIAMETER	mm	100	100	100	100	160	160	160	160	160	160	160	160
WEIGHT	kg	550	700	900	1.200	1.600	1.900	2.300	2.600	3.150	3.800	4.450	5.40

PROTECTIVE ENCLOSURE IP31		TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5
LENGTH (L)	mm	1.700	1.950	2.200	2.500	2.800
DEPTH (P)	mm	1.000	1.200	1.300	1.500	1.500
HEIGHT (H)	mm	1.850	2.000	2.400	2.650	2.900
ENCLOSURE WEIGHT	kg	220	260	320	360	400

INSULATION VOLTAGE 24 kV		100	160	250	400	630	800	1000	1250	1600	2000	2500	3150
LENGTH (A)	mm	1.100	1.150	1.250	1.450	1.450	1.450	1.650	1.650	1.900	1.900	1.900	2.200
DEPTH (B)	mm	650	650	650	800	800	800	1.000	1.000	1.200	1.200	1.200	1.200
HEIGHT (C)	mm	1.150	1.300	1.400	1.550	1.750	1.900	1.950	2.050	2.150	2.400	2.400	2.450
WHEEL INTERAXIS (D)	mm	520	520	670	670	820	820	820	820	1.000	1.000	1.000	1.000
WHEEL WIDTH	mm	40	40	40	40	50	50	50	50	50	50	50	50
WHEEL DIAMETER	mm	100	100	100	100	160	160	160	160	160	160	160	160
WEIGHT	kg	600	750	900	1.350	1.750	2.000	2.450	2.700	3.400	3.900	4.750	6.050

PROTECTIVE ENCLOSURE IP31		TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5
LENGTH (L)	mm	1700	1950	2200	2500	2.800
DEPTH (P)	mm	1000	1200	1300	1500	1.500
HEIGHT (H)	mm	1850	2000	2400	2650	2.900
ENCLOSURE WEIGHT	kg	220	260	320	360	400

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MF Trasformatori

CAST RESIN

from 100 to 3150 kVA - 17,5 – 24 kV
losses Co - Bk according to
IEC EN 50541-1

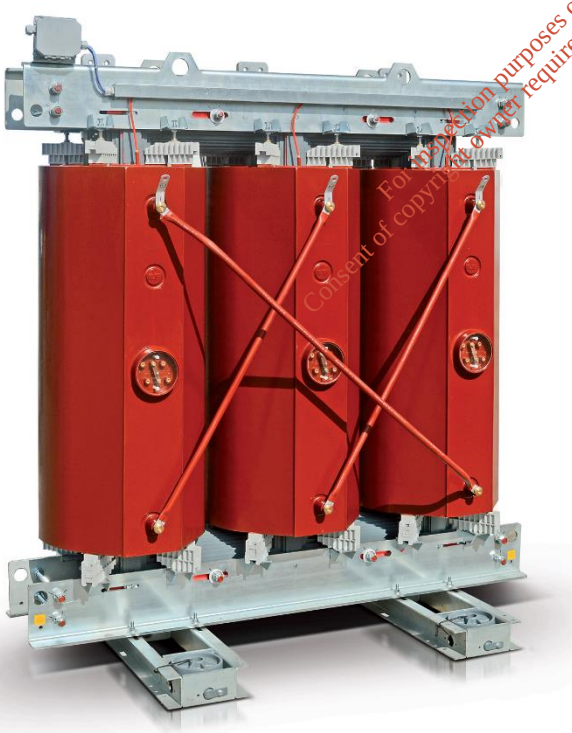
TR-PC

GENERAL INFORMATION

The new IEC EN 50541-1 has been prepared with the mission to improve the efficiency of the transformers.
This results in transformers with better efficiency which guarantee to our customers:

- savings in operating costs of the plant, due to low values of losses.
- consumption reduction of energy resources.

RATED OUTPUT kVA	100	160	250	400	630	800	1.000	1.250	1.600	2.000	2.500	3.150
EFFICIENCY AT 75°C												
COSφ 1 100% LOAD	97,79	98,04	98,35	98,52	98,70	98,74	98,82	98,88	98,94	99,02	99,00	99,04
COSφ 1 50% LOAD	98,21	98,42	98,65	98,81	98,86	99,00	99,07	99,11	99,18	99,21	99,20	99,24



PARTICULARITY

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- fire and pollution hazard areas.
- buildings with public access.

Moreover, their disposal is simple and with low environmental impact.

DESCRIPTION

The three-phase cast resin transformers have the following features:
- MV windings encapsulated in cast resin.
- LV windings impregnated with resin.

Magnetic core made using magnetic grain-oriented steel sheets with low loss, and the joints are Step-Lap inserted sheet.
- Level of partial discharges < 10 pC.
- Thermal class F – Temperature rise 100 K.
- Ambient temperature ≤ 40°C, altitude ≤ 1000 m.
- Self-extinguishing with low emission of gas, classification F1.
- Resistant to thermal shock, classification C2.
- Resistant to condensation and humidity, classification E2.

ACCESSORIES ALWAYS PROVIDED

- LV terminal connector plates
- MV voltage variation by off circuit tappings links
- Rating plate
- Lifting lugs
- 2 earthing points
- 4 bi-directional flat rollers

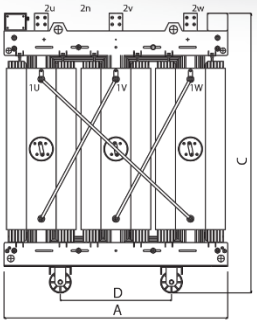
FROM 100 TO 3150 KVA 17,5 24 KV
LOSSES Co - Bk ACCORDING TO
IEC EN 505411

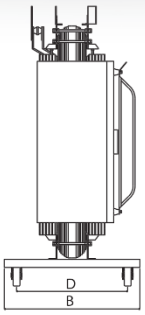
CAST RESIN
TR-PC

RATED OUTPUT kVA		100	160	250	400	630	800	1.000	1.250	1.600	2.000	2.500	3.150
NO-LOAD LOSSES	W	460	650	880	1.200	1.650	2.000	2.300	2.800	3.100	4.000	5.000	6.000
LOAD LOSSES AT 75 °C	W	1.800	2.550	3.325	4.800	6.650	8.225	9.625	11.375	14.000	15.750	20.125	24.500
LOAD LOSSES AT 120 °C	W	2.050	2.900	3.800	5.500	7.600	9.400	11.000	13.000	16.000	18.000	23.000	28.000
NO-LOAD CURRENT	%	1,4	1,4	1,2	1	0,8	0,8	0,8	0,8	0,7	0,7	0,6	0,6
IMPEDANCE VOLTAGE	%	6	6	6	6	6	6	6	6	6	6	6	6
INRUSH CURRENT IE/IN		10,5	10,5	10,50	10	10	9,5	9,5	9	9	8,5	8,5	8,5
EFFICIENCY AT 75°C													
COSΦ 1 100% LOAD	%	97,79	98,04	98,35	98,52	98,70	98,74	98,82	98,88	98,94	99,02	99,00	99,04
COSΦ 1 75% LOAD	%	98,07	98,29	98,55	98,72	98,87	98,91	98,98	99,03	99,09	99,15	99,14	99,17
COSΦ 0,9 100% LOAD	%	97,55	97,83	98,17	98,36	98,56	98,60	98,69	98,76	98,83	98,91	98,90	98,94
COSΦ 0,9 75% LOAD	%	97,87	98,11	98,40	98,58	98,75	98,79	98,87	98,92	98,99	99,06	99,04	99,08
EFFICIENCY AT 75°C													
COSΦ 1 100% LOAD	%	1,96	1,76	1,50	1,37	1,23	1,2	1,14	1,09	1,05	0,96	0,98	0,95
COSΦ 0,9 100% LOAD	%	4,21	4,06	3,86	3,76	3,64	3,62	3,57	3,53	3,5	3,43	3,44	3,42
NOISE													
SOUND POWER LEVEL (LwA)	dB(A)	59	62	65	68	70	72	73	75	76	78	81	83

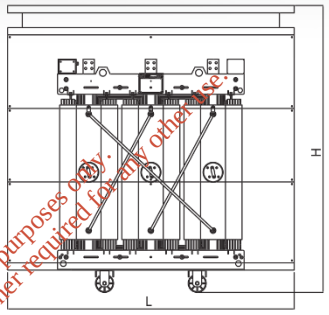
SIZES AND WEIGHTS (INDICATIVE)

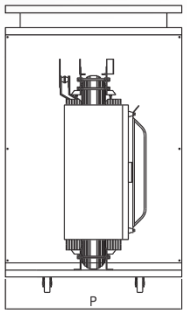
Without enclosure IP 00





With IP 31 Protective enclosure





INSULATION VOLTAGE 17,5 kV		100	160	250	400	630	800	1000	1250	1600	2000	2500	3150
LENGTH (A)	mm	1.000	1.100	1.150	1.250	1.450	1.450	1.650	1.650	1.900	1.900	1.900	2.200
DEPTH (B)	mm	650	650	650	650	800	800	1.000	1.000	1.000	1.200	1.200	1.200
HEIGHT (C)	mm	1.100	1.200	1.350	1.500	1.700	1.800	1.850	2.050	2.150	2.250	2.350	2.400
WHEEL INTERAXIS (D)	mm	520	520	520	520	670	670	820	820	820	1.000	1.000	1.000
WHEEL DIAMETER	mm	100	100	100	100	160	160	160	160	160	160	160	160
WEIGHT	kg	500	700	900	1.200	1.600	1.900	2.300	2.600	3.150	3.800	4.450	5.350

PROTECTIVE ENCLOSURE IP31		TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5
LENGTH (L)	mm	1.700	1.950	2.200	2.500	2.800
DEPTH (P)	mm	1.000	1.200	1.300	1.500	1.500
HEIGHT (H)	mm	1.850	2.000	2.400	2.650	2.900
ENCLOSURE WEIGHT	kg	220	260	320	360	400

INSULATION VOLTAGE 24 kV		100	160	250	400	630	800	1000	1250	1600	2000	2500	3150
LENGTH (A)	mm	1.100	1.150	1.250	1.250	1.450	1.450	1.650	1.650	1.900	1.900	1.900	2.200
DEPTH (B)	mm	650	650	650	800	800	800	1.000	1.000	1.200	1.200	1.200	1.200
HEIGHT (C)	mm	1.150	1.300	1.400	1.550	1.750	1.900	1.950	2.050	2.150	2.400	2.400	2.450
WHEEL INTERAXIS (D)	mm	520	520	670	670	820	820	820	820	1.000	1.000	1.000	1.000
WHEEL DIAMETER	mm	100	100	100	100	160	160	160	160	160	160	160	160
WEIGHT	kg	600	750	900	1.300	1.700	2.000	2.400	2.700	3.300	3.900	4.650	5.850

PROTECTIVE ENCLOSURE IP31		TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5
LENGTH (L)	mm	1700	1950	2.200	2500	2.800
DEPTH (P)	mm	1000	1200	1.300	1500	1.500
HEIGHT (H)	mm	1850	2000	2.400	2650	2.900
ENCLOSURE WEIGHT	kg	220	260	320	360	400

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APPENDIX C

- NOISE MANAGEMENT PLAN -

NOISE MANAGEMENT PLANNING

The Noise Management Plan (NMP) is a core document that is intended to detail operational and control measures appropriate to management and control of noise at the site. The format of the NMP should provide sufficient detail to allow operators and maintenance staff to clearly understand the operational procedures for both normal and abnormal conditions.

A Noise Management Plan should be prepared for all processes. The NMP should also include sufficient feedback data to allow site management (and local authority inspectors) to audit site operations. An example of some of the issues to be considered is summarised as follows. More detailed guidance is provided with this document.

- A summary of the site, noise sources and the location of receptors.
- Details of the site management responsibilities and procedures for reporting faults, identifying maintenance needs and complaints procedure.
- Noise critical plant operation and management procedures (e.g. correct use of plant, process, materials, and checks on plant performance, maintenance and inspection).
- Operative training.
- Housekeeping.
- Maintenance and inspection of plant (both routine and emergency response).
- Record keeping – format, responsibility for completion and location of records.
- Emergency breakdown and incident response planning including responsibilities and mechanisms for liaison with the local authority.
- Public relations.

The Noise Management Plan is a living document and should be reviewed annually.

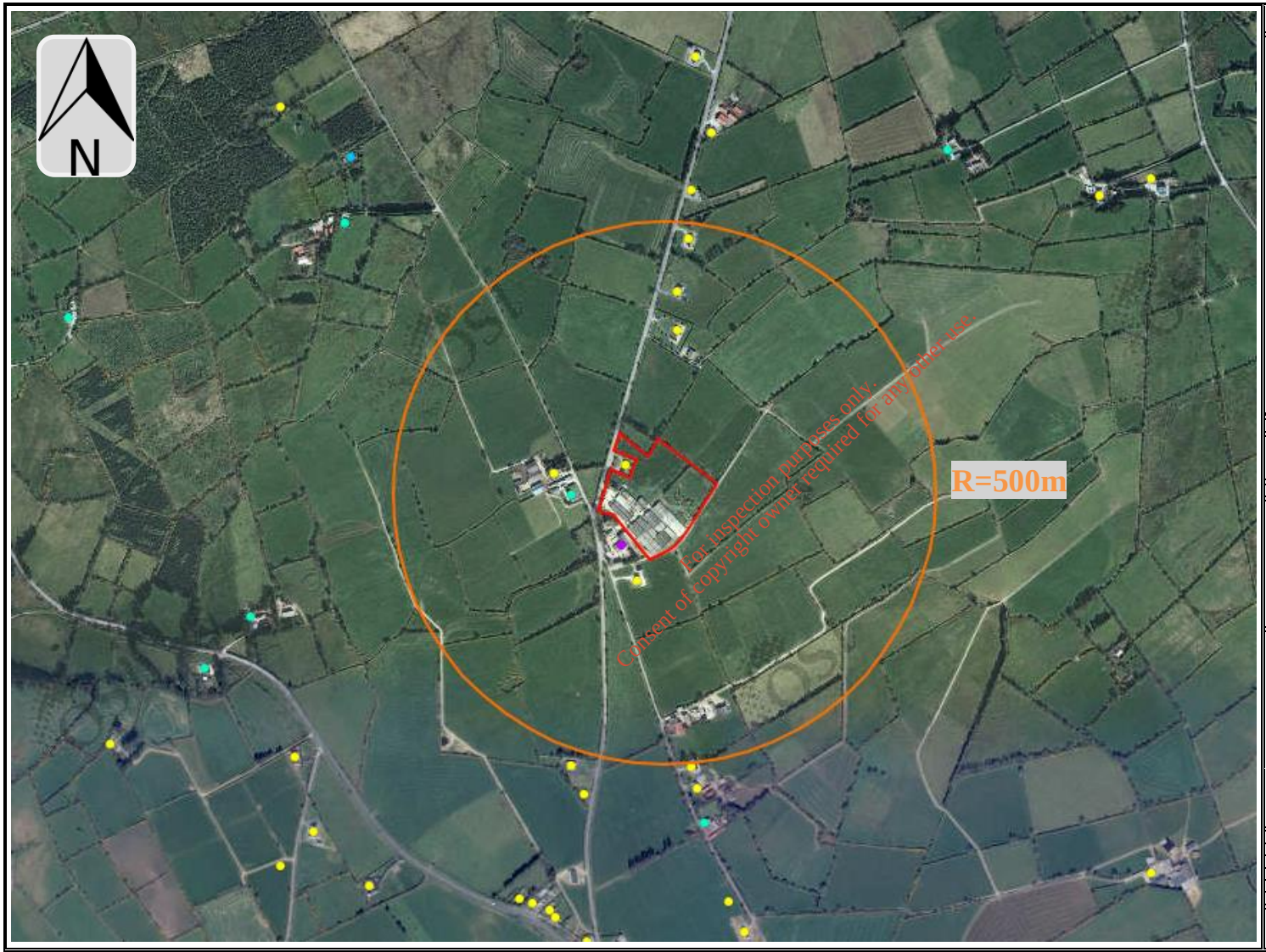
It should form the basis of a documented Environmental and Noise Management system for the operating site. The Noise Management System documentation should define the roles of the Operator and the Caretaker and sets out templates in relation to the operating of the farm and reporting procedures to be employed. Requirements for the NMP should be implemented throughout the site with a branched management system implemented in order to share responsibility around the site. The farm manager should ensure all works are performed in accordance with the NMP.

	Noise Source	Specific Source	Action Plan	Monitoring Required	Review and Comments - Monthly
1.a			All relevant staff to be trained on Noise Management measures.	Immediate	
1.b			Review and update NMP initially on annual basis, or following any relevant changes at the site. Key Performance Indicators (KPI's): - Number of Complaints, - Number of abnormal noise events (site checks), - Results/recommendations of any noise surveys	Annual / as necessary	
1.c			Carry out weekly noise patrol checks and keep log of all findings, including weather conditions and wind direction. Note any equipment, vehicles or staff/visitor actions leading to excessive/unusual increased noise. At times where a complaint has been received or issues identified during environmental checks, monitoring or during maintenance, daily noise monitoring should be carried out at times relevant to the complaint or identified issue until the investigation is complete.	Weekly / Daily as necessary	
1.d			Keep a log of environmental noise complaints, including description of the noise, details of investigation, any follow-up actions and outcomes.	On-going	
1.e			Keep a log of noise monitoring carried out, including reason for survey, main findings and remedial actions taken.	On-going	
1.f			Inform neighbours of any abnormal planned operations/projects which may lead to significantly increased noise. Provide detail of timing and likely duration to minimise noise impact. Provide contact details to neighbours of relevant members of staff for the receipt of environmental complaints.	As applicable	

	Noise Source	Specific Source	Action Plan	Monitoring Required	Review and Comments - Monthly
2.	Construction	Excavators/large plant	Carry out construction activities associated with elevated noise levels during normal working hours where practicable. (07:00am to 19:00pm Monday to Friday)	On-going	
3.	Construction	Off-schedule works	Any works outside of these times should be notified to any potentially effected local residents in good time and prior to specified works commencing.	Prior to off-schedule works	
4.	Construction	Proposed Earth Berm	Construct an earth berm along the northern boundary of the site as defined within the Noise Impact Assessment Report (Ref: ENA-20-9668).	As part of proposed works.	
5.	Pig Shed	Feeding	Ensure all feeding systems are passive ad libitum type, to prevent feeding time animal noise. Ensure feed supply rates are maintained to ensure continuous feed availability and prevent anticipation for feed delivery.	On-going.	
6.	Pig Shed	Destocking	Continue to move pigs to the loading bay on the evening before transport. This will reduce animal noise as the pigs are acclimatised to the bay and reduce the time for destocking to occur.	On-going	
7.	Employees	Employees/visitors	Inform all employees and visitors of noise awareness.	Monitoring on-going, awareness is continuous	
8.	Yard	Tractors (slurry removal)	The removal of shed slurry should be conducted within normal working hours (08:00am to 18:00pm Monday to Friday).	Monitor during operations	

	Noise Source	Specific Source	Action Plan	Monitoring Required	Review and Comments - Monthly
9.	Equipment	Equipment	Consult with manufacturer regarding associated noise emissions prior to purchase of any new equipment.	As equipment is being purchased	
10.	Equipment	Equipment	Use existing farm buildings to shield closest Sensitive Receptors from any potentially noisy new equipment (e.g. boiler, pump, motors etc.) where possible.	As equipment is installed	
11.	Vehicles	Vehicles entering and leaving site	Maintain site roads in good condition.	As per preventative maintenance schedule	
12.	Vehicles	Vehicles entering and leaving site	Ensure that a site speed limit of onsite traffic speed limit of 20 km /h is maintained. Ensure excessive revving of engines does not occur, particularly during evening or night-time periods.		
13.	Vehicles	Site Vehicles	Ensure site owned/operated forklifts and vehicles are well maintained (especially exhaust systems and silencers).	Monitor on-going, awareness is continuous	
14.	Equipment	Equipment	Maintain equipment and ventilation to ensure high efficiency.	As per preventative maintenance schedule	
15.	Equipment	New Equipment	Consult with manufacturer regarding noise levels before buying any new equipment.	As equipment is being purchased	

	Noise Source	Specific Source	Action Plan	Monitoring Required	Review and Comments - Monthly
16.	Employees	Manual handling / Forklift operation	Reduce impulsive noise in external areas by lowering of materials to ground level where practical. Reduce drop heights of bulk materials by design.	Monitor on-going, awareness is continuous	
17.	Site wide	Alarm Testing	Testing of emergency generators or alarms should be carried out during the daytime of the normal working week between 09.00 and 17.00 Monday to Friday.	On-going	
18.	Site wide	All areas	Consider potential noise as an aspect in any future infrastructure works. Assess opportunities for reduction of existing noise sources where practical within project scope.	Project Planning	



Notes

Site Boundary
0.5km Radius
From farm centre

– Residential

– Residential and Commercial

– Commercial

Project Title:

RECEPTORS WITHIN 0.5KM

Client Name:

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BALLYFASKIN, BALLYLANDERS,
CO. LIMERICK

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Drawing Status:	Scale:	NTS	A4
Report	Datum:		Myplan.ie
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D9886-02	Checked:		MF
Revision:	Approved:		-
R0	Date:		28/09/2020