MEESDEN HALL, MEESDEN, BUNTINGFORD SG9 0AZ Extensions and Internal Alterations to a Grade II Listed Dwelling



Roofing Material Samples

January 2023

Proposed Slates (West Service Wing dual-pitched roof and Utility Room mono-pitch roof.)





CWT-Y-BUGAIL WELSH BLUE/GREY face view

Side view

Description

Cwt Y Bugail Welsh Slate roofing is quarried from what is widely recognised as the finest quality and most durable slate deposit in the world. Cwt Y Bugail is located in Llan Ffestiniog on the edge of the Snowdonia National Park, North Wales. Cwt Y Bugail slate is generally dark blue grey in colour. The slate is naturally split along cleavage planes created by over 590 millions of years of intense pressure and heat to produce extremely strong roofing slates with a riven surface.

Features and benefits:

- Conform to BS EN 12326-1: (A1, S1, T1).
- Hold BS Kitemark accreditation and have a proven durability of in excess of 100 years
- absorbs less than 0.3% of water
- has a high resistance to acid and alkali that helps keep its natural colour even in Ultra Violate light
- it is non-combustible
- it is compatible with all other building materials
- Capital thickness grade(5.5 mm),

Refer to the attached product literature.

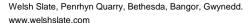


Welsh Slate, Penrhyn Quarry, Bethesda, Bangor, Gwynedd. LL57 4YG United Kingdom

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www.welshslate.com			EN 12326-1:	2014		Page 1 of 4
Reference of this commercial document:		IMSD 8.	2.4-23a	Date of issue		April 2016 (Issue 1)
Commercial docun	nent issued by: Welsh Slate,	Penrhyn Quarry, Bethesda, Bangor, Gwynedd, LL57 4YG United Kir			<u>.</u> ngdom	
Location of quarry:	Cwt-y-Bugail Slate Quarry, I	_lan Ffestiniog, Bl	aenau Ffestiniog	ı, Gwynedd, LL41	4RF	
	ords the conformity of the pro			-	•	
_	test results and the requirem N 12326-1:2014 and EN 1232		6-1:2014. The tes	sts referred to an	d the criteria	
Date of sampling		November 2015 Date of testing			November 2015 - April 2016	
Product description and		Cwt-y-Bugail Capital Roofing Slate				
commercial name		500x300mm				Conformity
Relation between	n bedding and cleavage	Beds parallel to cleavage				
1. Dimensional tolerances						
Format		Rectangular				
Deviation from dec	clared length	±0mm				YES
Deviation from dec	clared width	±1mm				YES
Deviation from squ	areness	0.25%				YES
Deviation from stra	aightness of edges	1.0mm				YES
Slate type for deviation of flatness		Very flat	Flat (Capital)	Normal (County)	Non-flat (Celtic)	
Deviation from flatness		0.1%				YES
2. Thickness						
Nominal thickness and variation of individual thickness against nominal thickness		5.5mm, ± 35%				YES
3. Strength						
Characteristic MoF	₹	Transverse	29.5 N/mm²	Longitudinal	56.3 N/mm²	NR
4. Water absorption		Code W1 (≤0.6): 0.13%			YES	
5. Freeze thaw						NR
6. Thermal cycle test		T1				YES
7. Apparent calcium carbonate content		1.62%				YES
8. Sulfur dioxide exposure tests	≤ 20% apparent calcium carbonate	S1			YES	
	> 20% apparent calcium carbonate					NA
9. Non-carbonate carbon content		1.0%				YES
10. External fire exposure		Deemed to satisfy class BROOF				YES
11. Reaction to fire		Deemed to satisfy class A1				YES
12. Release of dangerous substances		None in conditions of use as roofing or external cladding			NR	



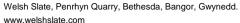
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			EN 12326-1:	2014			Page 2 of 4
Date of sampling and testing		If more than one date is applicable to sampling or testing they should be indicated against the individual test results					
Product description		Slate for roofing and external cladding or carbonate slate for roofing and external cladding.					
		Slate type and origin					
1. Dimensional tolerances							
Length and width		Maximum deviation ± 5mm					
Deviation from squareness		Maximum deviation ± 1% of the length					
Deviation from straightness of edges		Slate length ≤ 5	500mm Permit	ted deviation ≤	5mm		
		Slate length > 500mm Permitted deviation ≤ 1% of the length					
Flatness : The L	imits of deviation from the	Slate type	Maximum deviation from flatness as a % of the slate length				th
flatness are def	ined for four types of	Very flat	< 0.9				
slate. The bevelled edges shall be applied to the convex face. Slates with deviation from flatness in excess of the		Flat	< 1.0				
		Normal	< 1.5				
ilmit may be use	ed for special applications.	Non-flat	< 2.0				
3. Strength:	Longitudinal and transver	ormance in the appropriate sulfur dioxide test (if required) as shown in 7 and 8 below. rse characteristic modulus of rupture; there is no limit for characteristic modulus. However ess is determined as a function of the bend strength using the formulae given below, local aditional construction techniques.					
$el = X \sqrt{\frac{I}{Rcl}}$ and $et = X \sqrt{\frac{b}{Rct}}$							en below, local
and	,	et is the tr I is the le b is the w Rcl is the c Rct is the c X is a cor	ansverse thickength of the slate vidth of the slate haracteristic to the haracteristic transtant determinus/2. N.	kness, (in mm); ate, (in mm); ate, (in mm); ae, (in mm); ongitudinal mod ansverse modu aned as a functio OTE: It may be	ulus of rupture, Ilus of rupture, (on of climate and different for ead	(in N/mm²); d the traditiona	al construction
and et = X	,	el is the lo et is the tr l is the le b is the w Rcl is the c Rct is the c X is a cor techniques (in le for the member	ansverse thickength of the slate vidth of the slate haracteristic to the haracteristic transtant determinus/2. N.	kness, (in mm); ate, (in mm); ate, (in mm); ae, (in mm); ongitudinal mod ansverse modu aned as a functio OTE: It may be	ulus of rupture, Ilus of rupture, (on of climate and different for ead	(in N/mm²); d the traditiona	al construction
and et = X	$\sqrt{\frac{b}{Rct}}$	el is the lo et is the tr l is the le b is the w Rcl is the c Rct is the c X is a cor techniques (in le for the member	ransverse thickength of the slate vidth of the slate haracteristic to the haracteristic transtant determined by 1/2. mm-1/2). Note that the state of use a state of use a state of the slate of the slat	kness, (in mm); ate, (in mm); ate, (in mm); ae, (in mm); angitudinal mod ansverse modu ansverse modu ansverse modu according to the	ulus of rupture, ulus of rupture, (on of climate and different for each table below.	(in N/mm²); d the traditiona ch formula and	al construction d is selected
and et = X	$\sqrt{\frac{b}{Rct}}$	el is the lo et is the tr / is the le b is the w Rcl is the c Rct is the c X is a cor techniques (in le for the member	ansverse thickength of the slate idth of the slate haracteristic to the stant determined by the stant determined by the state of use a transverse	kness, (in mm); ate, (in mm); ae, (in mm); angitudinal mod ansverse modu ned as a functio OTE: It may be according to the	ulus of rupture, ulus of rupture, (on of climate and different for each table below.	(in N/mm²); d the traditiona ch formula and Transverse	al construction d is selected Longitudinal
and et = X	$\sqrt{\frac{b}{Rct}}$	el is the lo et is the tr / is the le b is the w Rcl is the c Rct is the c X is a cor techniques (in le for the member Member state Belgium	ransverse thickength of the slavidth of the slavidth of the slavidth aracteristic to the stant determined by the stant determined by the stant of use a transverse	kness, (in mm); ate, (in mm); e, (in mm); e, (in mm); engitudinal mod ansverse modu ned as a functio OTE: It may be according to the Longitudinal	ulus of rupture, ulus of rupture, (on of climate and different for each table below. Member state Czech Repub.	(in N/mm²); d the traditiona ch formula and Transverse	al construction d is selected Longitudinal

Those member states that have not declared a national value should select a value or pair of values in relation to their countries climate and traditional construction techniques. It should not be less than the minimum value or pair of values given above.

el and et are determined by using the length / and the width b of the slates. The maximum value determined is the basic individual thickness of the slate, ebi. The basic individual thickness is increased in relation to the slates performance in the appropriate sulphur dioxide test as shown in 7 and 8 below.



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n: t:	EN 12326-1:2014 Code W1 (≤0.6), W1 (>0.6), or W2 Slates tested indicate the mean value of the modulus of rultransverse and longitudinal directions before and after the (test (if W1(>0.6)), or not required.	-	
	Slates tested indicate the mean value of the modulus of rup transverse and longitudinal directions before and after the	-	
t:	transverse and longitudinal directions before and after the	•	
est:	The following table explains the meaning of the test codes		
Observation in the test		Conformity to the standard	
No changes in appearance. Surface oxidation of metallic minerals. Colour changes that neither affect the structure nor form runs of discolouration.		Acceptable	
Oxidation or appearance changes of the metallic inclusions with runs of discolouration but without structural changes.		Acceptable	
Oxidation or appearance changes of the metallic minerals which penetrate the slate and risk the formation of holes. Acceptable subjection of the metallic minerals which penetrate the slate is note below.			
at xio sc	neither affect the strudation or appearance colouration but without dation or appearance risk the formation of	changes in appearance. Surface oxidation of metallic minerals. Colour changes neither affect the structure nor form runs of discolouration. dation or appearance changes of the metallic inclusions with runs of colouration but without structural changes. dation or appearance changes of the metallic minerals which penetrate the slate	

NOTE: It is best only to use slates within code T3, which potentially may result in water penetration selectively with suitable methods of construction that avoid such penetration. Slates showing exfoliation splitting or other structural changes in this test are not acceptable.

7. Apparent calcium carbonate content:

There is no limit on apparent calcium carbonate content. However, the apparent calcium carbonate content determines which sulfur dioxide exposure test procedure should be carried out and, together with the strength, the minimum nominal thickness of the product.

If the carbonate content is less than or equal to 20% then the sulfur dioxide exposure test procedure in EN 12326-2:2011, 14.1 applies. If the carbonate content is more than 20%, the sulfur dioxide exposure test procedure in EN 12326-2:2011, 14.2 applies. The minimum thickness is calculated using the table below.

8. Minimal nominal thickness in relation to apparent calcium carbonate content and sulfur dioxide exposure code

Carbonate content %	SO2 exposure test code from EN 12326-2:2011, 14.1	Depth of softened layer from EN12326-2:2011, 14.2	Thickness adjustment	
	S1		None	
≤ 5.0	S2		ebi + 5%	
_ 0.0	\$3		ebi ≥ 8.0mm or switch to the test in EN 12326-2:2011, 14.2	
> 5.0	S1		ebi + 5%	
	S2		ebi + 10%	
≤ 20.0	S3		ebi ≥ 8.0mm or switch to the test in EN 12326-2:2011, 14.2	
> 20.0		0mm to 0.70mm	ebi + 0.50mm + 7t²	

ebi is the basic individual thickness obtained from 3 above (in mm)

t is the thickness of the softened layer obtained from EN 12326-2:2011, 14.2 (in mm)

9. Non-carbonate carbon content: The non-carbonate carbon content shall be less than 2%



CE Marking

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Welsh Slate roofing products conform to the requirements of the CE mark.

The following table provides the necessary information required to demonstrate conformity of Cwt-y-Bugail Capital Roofing Slate

CE				
Welsh Slate Ltd, Penrhyn Quarry, Bethesda, Near Bangor, Gwynedd, Wales, UK, LL57 4YG				
12				
001CQ-DoP2014-11-03				
EN 12326-1:2014				
Cwt-y-Bugail Capital				
Intended to be used as discontinuous roofing and external cladding				
Dimensional variation				
Nominal thickness	5.5mm			
Individual thickness	5.5mm (< +/- 35%)			
Deviation of length and width	Complies			
Deviation of edge straightness	Complies			
Deviation of rectangularity	Complies			
Mechanical resistance (Characteristic modulus of rupture)				
Transverse	29.5 N/mm²			
Longitudinal	56.3 N/mm²			
Water permeability - water absorption	W1 (≤0.6%)			
Apparent calcium carbonate content	≤ 5%			
Durability				
Water absorption	W1 (≤0.6%)			
Freeze-thaw cycling	Not required			
Thermal cycling	T1			
Sulfur dioxide exposure	S1			
Non-carbonate carbon content Complies: ≤ 2%				
Release of dangerous substances: None in conditions of use as roofing or external cladding				
External fire performance: Deemed to satisfy				