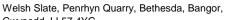




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Reference of this commercial document:	IMSD 8.2.4-23c Date of issue		May 2018 (Issue 2)			
Commercial document issued by: Welsh Slate, Penrhyn Quarry, Bethesda, Bangor, Gwynedd, LL57 4YG United Kingdom						
Location of quarry: Cwt-y-Bugail Slate Quarry, Llan Ffestiniog, Blaenau Ffestiniog, Gwynedd, LL41 4RF						
This document records the conformity of the pre-			•	•		
the meaning of the test results and the requiren are contained in EN 12326-1:2014 and EN 123:		6-1:2014. The te	sts referred to an	id the criteria		
Date of sampling	December 2017 Date of testing			Jan - April 2018		
Product description and	Cwt-y-Bugail Celtic Roofing Slate					
commercial name	500x250mm				Conformity	
Relation between bedding and cleavage	Beds parallel to	cleavage				
Dimensional tolerances						
Format	Rectangular	Rectangular				
Deviation from declared length	±0mm				YES	
Deviation from declared width			YES			
Deviation from declared squareness	0.3%				YES	
Deviation from straightness 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	9.0mm, ± 35%			YES		
3. Strength						
Characteristic MoR	Transverse	38.7 N/mm²	Longitudinal	77.8 N/mm²	NR	
4. Water absorption	Code W1 (≤0.6): 0.29%			YES		
5. Freeze thaw					NR	
6. Thermal cycle test	T1				YES	
7. Apparent calcium carbonate content	0.0%				YES	
8. Sulfur dioxide ≤ 20% apparent calcium carbonate	S1			YES		
exposure tests > 20% apparent calcium carbonate					NA	
9. Non-carbonate carbon content		YES				
10. External fire exposure	Deemed to satisfy class BROOF				YES	
11. Reaction to fire Deemed to satisfy class A1				YES		
2. Release of dangerous substances None in conditions of use as roofing or external cladding NR				NR		



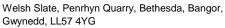
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Date of sampling	and testing	If more than one date is applicable to sampling or testing they should be incagainst the individual test results			ndicated			
Product description	on	Slate for roofing and external cladding or carbonate slate for roofing and external cladding. Slate type and origin			external			
1. Dimensional to	lerances	Olate type and origin						
Length and width		Maximum deviation ± 5mm						
Deviation from squareness		Maximum deviation ± 1% of the length						
Deviation from straightness of edges					5mm			
		Slate length ≤ 500mm Permitted deviation ≤ 5mm Slate length > 500mm Permitted deviation ≤ 1% of the length						
		Slate type						
	Flatness: The limits of deviation from the flatness are defined for four types of slate. The bevelled edges shall be applied to the convex face. Slates with		< 0.9					
slate. The bevelle			< 1.0					
deviation from flat	tness in excess of the	Normal	< 1.5					
limit may be used for special applications.		Non-flat	< 2.0					
I r 3. Strength:	The basic nominal thickn local climate conditions a relation to the slates perfunction to the slates perfunction to the slates perfunction to the basic nominal thickness and training the conditions and training the slates of the slates are slates as a slate of the slates are slates as a slates are slates are slates as a slates are slates are slates as a slates are	nd traditional coormance in the a	onstruction tec appropriate su c modulus of r d as a function	hniques. The b Ifur dioxide test rupture; there is n of the bend st	asic nominal thi t (if required) as no limit for cha	ckness is increshown in 7 ar	eased in and 8 below.	
el = X and $et = X$	/ <u>b</u>	Where el is the longitudinal thickness, (in mm); et is the transverse thickness, (in mm); / is the length of the slate, (in mm); b is the width of the slate, (in mm); Rcl is the characteristic longitudinal modulus of rupture, (in N/mm²); Rct is the characteristic transverse modulus of rupture, (in N/mm²); X is a constant determined as a function of climate and the traditional construct techniques (in N½.mm-½). NOTE: It may be different for each formula and is selected for the member state of use according to the table below.						
Nation	nal X Factors:	Member state	Transverse	Longitudinal	Member state	Transverse	Longitudinal	
		Belgium	1.0	1.0	Czech Repub.	1.2	1.2	
		Ireland	0.9	1.1	Italy	1.2	1.2	
		France	1.0	1.0	Spain	1.0	1.0	

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.



 $ebi + 0.50mm + 7t^2$

WELSH SLATE

> 20.0

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

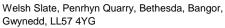
t is the thickness of the softened layer obtained from EN 12326-2:2011, 14.2 (in mm)

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

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. Water Absor	otion:	Code W1 (≤0.6	6), W1 (>0.6), or W2			
5. Freeze-thaw test:		Slates tested indicate the mean value of the modulus of rupture after 50 cycles in transverse and longitudinal directions before and after the freeze/thaw test, if relevent, (test (if W1(>0.6)), or not required.				
3. Thermal cycl	e test:	The following t	table explains the meaning of	the test codes		
Code		Observa	tion in the test	Conformity to the standar		
T1	No changes in appearand that neither affect the stru		dation of metallic minerals. Co runs of discolouration.	Acceptable		
T2		on or appearance changes of the metallic inclusions with runs of uration but without structural changes.			Acceptable	
Т3	Oxidation or appearance changes of the metallic minerals which penetrate the slate and risk the formation of holes.				Acceptable subject to the note below	
7. Apparent calcium carbonate content:		There is no limit on apparent calcium carbonate content. However, the apparent calciu 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.				
		I I I I I I I I I I I I I I I I I I I	illess is calculated using the ta			
3. Minimal nom	inal thickness in relation to	apparent calciu	um carbonate content and sulf		sure code	
Carbonate content %	SO2 exposure test EN 12326-2:201	code from	um carbonate content and sulf Depth of softened layer from EN12326-2:2011, 14.2	ur dioxide expo	sure code ckness adjustment	
Carbonate	SO2 exposure test	code from	Depth of softened layer	ur dioxide expo		
Carbonate content %	SO2 exposure test EN 12326-2:201	code from	Depth of softened layer	ur dioxide expo	ckness adjustment	
Carbonate	SO2 exposure test EN 12326-2:201 S1	code from	Depth of softened layer	ur dioxide expo	ckness adjustment	
Carbonate content % ≤ 5.0	SO2 exposure test EN 12326-2:201 S1	code from	Depth of softened layer	ur dioxide expo	ckness adjustment None ebi + 5% or switch to the test in E	
Carbonate content %	SO2 exposure test EN 12326-2:201 S1 S2	code from	Depth of softened layer	ur dioxide expo	None ebi + 5% or switch to the test in E 326-2:2011, 14.2	

0mm to 0.70mm





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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 Celtic Roofing Slate

Welsh Slate Ltd, Penrhyn Quarry, Bethesda, Near Bangor, Gwynedd, Wales, UK, LL57 4YG				
12				
0030	CQ-DoP2014-11-03			
EN 12326-1:2014				
Cwt-y-Bugail Celtic				
Intended to be used as discontinuous roofing and external cladding				
Dimensional variation				
Nominal thickness	9.0mm			
Individual thickness	9.0mm (< +/- 35%)			
Deviation of length and width	Complies			
Deviation of edge straightness	Complies			
Deviation of rectangularity	Complies			
Mechanical resistance (Characteristic modulus of rupture)				
Transverse	Transverse 38.7 N/mm²			
Longitudinal	77.8 N/mm²			
Water permeability - water absorption	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	Т1			
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				