Appendix F, *Product Grouping Examples*

Contents

1 Introduction

According to the INSULATION KEYMARK Scheme 2 different certification procedures are possible:

- Product Certification (Products and Product families)
- Certification of Products grouped Property by Property.

In practice an overview or a so-called product catalogue shall be established and agreed upon between the manufacturer and the empowered certification body. Within this overview/product-catalogue, all certified products with its certified performances shall be listed indicating also the lines and the plant/factory. According the agreed overview/product-catalogue, the product grouping for testing and declaring will be decided upon.

The main aims of product grouping and the major principles are described in chapter 7.3 of the scheme rules.

The main reason for grouping more than one product in a Product Group can be to obtain more statistical data for products which are identical with only one exception especially for λ. The reasons can be also marketing reasons for different names for different applications or markets or to reduce testing costs.

In any case the product grouping is a task of the manufacturer but has to be agreed and accepted by the certification body.

2 Certification procedures

2.1 Product Certification (Products and Product families)

For producers who want to certify a small number of products in one production plant. The premise is that each single product can be characterised and differentiated. Every product (brand name) / product family can be then certified individually with a KEYMARK Product Certificate.

Product Certification is used for thermal insulation products for building equipment and industrial installations.

A product family can be e. g. **Mineral Wool pipe sections** acc. EN 14303 with different facings and/or names or **Flexible Elastomeric Foam (FEF) tubes** or **sheet products** acc. EN 14304 with different colours and/or names for different applications. In both cases the products have the identical declared values for example Thermal Conductivity, Maximum Service Temperature and Chloride Content but not for Reaction to Fire

The example in table 1 shoes a producer of thermal insulation products for technical applications with 5 different products and 1 product family. 6 KEYMARK Product Certificates can be issued if <u>all</u> declared properties are tested positive (only the Reaction to Fire can be grouped by property). For the product family (B) it is enough that one representative (e.g. unfaced or faced with Alu or faced with Tissue) will be sampled and tested.

Table 1: Product Certification and number of annual audit tests

Grouping by Product or Product family	Brand names	Declared Properties			
		Reaction to Fire	Maximum Service Temperature	$\lambda(\vartheta)$	Chloride
→ A	Product A	A1	600	$\lambda_1(\vartheta)$	CL10
→ B (Product family)	Product B	A1	450	$\lambda_2(\vartheta)$	CL10
	Product B Alu	A2			
	Product B Tissue	A2			
→ C	Product C	B	250	$\lambda_3(\vartheta)$	CL10
→ D	Product D	B	500	$\lambda_4(\vartheta)$	CL10
→ E	Product E	B	650	$\lambda_5(\vartheta)$	CL10
→ F	Product F	C	680	$\lambda_6(\vartheta)$	CL10
6 products/families	**Number of audit tests**	**4/(2 years)*)**	**6/year**	**6/year**	**6/year**
-> 6 KEYMARK Product Certificates (5 products, 1 product family)					

*) The Reaction to Fire characteristic can be grouped Property by Property

2.2 Certification of Products grouped Property by Property

For producers with a large number of products the grouping property by property should be always be considered. Normally the product names are clearly distinguished but the declaration contains only a limited combination of property classes.

Product Certification is used for thermal insulation products for Buildings.

The grouping by Property by Property of a thermal insulation products for Buildings will lead in the example of table 2 to 1 KEYMARK Certificate for all grouped products if all declared Property Groups are tested positive.

Table 2: Certification of Products grouped Property by Property and number of annual audit tests

Brand names	Grouping Property by Property ↓	↓	↓	↓
	Reaction to Fire	Compressive strength	λ 10°C	Water absorption
Product A	A1	50	0,030	WS1
Product B	A1	50	0,032	WS1
Product B Alu	A2	50	0,032	WS1
Product B Tissue	A2	50	0,032	WS1
Product C	B	80	0,033	WS1
Product D	B	80	0,040	WS1
Product E	B	100	0,040	WS1
Product F	C	100	0,040	WS1
Number of audit tests (Property groups = 12)	**4/(2 years)**	**3/year**	**4/year**	**1/year**
-> 1 KEYMARK Group Certificate (all grouped products)				

Based on the product catalogue and the outcome of the KEYMARK certification activities, the manufacturer can obtain on his choice 6 additional KEYMARK Certificates for the 5 products and the 1 product family if all declared properties of these products are tested positive (only the Reaction to Fire can be grouped by property). Of course additional audit tests will be required to cover all declared properties of the certified product (Table 3).

Table 3: Certification of Products grouped Property by Product with additional KEYMARK Certificates for the products/families and the required number of annual audit tests

Grouping by Product or Product family	Brand names	Grouping Property by Property ↓ ↓ ↓ ↓			
		Reaction to Fire	Compressive strength	λ 10°C	Water ab-sorption
→ A	Product A	A1	50	0,030	WS1
→ B (Product family)	Product B		50	0,032	WS1
	Product B Alu	A2			WS1
	Product B Tissue				WS1
→ C	Product C	B	80	0,033	WS1
→ D	Product D		80	0,040	WS1
→ E	Product E		100	0,040	WS1
→ F	Product F	C	100	0,040	WS1
	Audit tests (Property groups = 12) -> **1 Group Certificate**	**4/(2 years)**	**3/year**	**4/year**	**1/year**
6 products/families	**Additional audit tests -> 6 Product Certificates (5 products, 1 product family)**	**-**	**3/year**	**2/year**	**5/year**

3 Examples for producers grouping product Property by Property

An example can be a **Mineral Wool** production plant which produces a large number e.g. 150 to 200 different thermal insulation products for buildings which are clearly differentiated by names but the declaration contains only a limited combination of property classes.

The mineral wool products consist of

- Inorganic fibres and facings
- Organic binders, sometimes adhesives and facings with organic content.

Reaction to Fire strongly depends on the content of combustible organic materials in binders, facings and adhesives. Also Thermal Conductivity, Compressive Stress, Water Absorption and so on strongly depend on binder content, main fibre direction, but also on density, air flow resistance and more properties.

The grouping will follow EN 13172

1. Parameter Reaction to Fire
2. Parameter Thermal Conductivity groups

2a. Parameter Thickness Groups

3. Parameter mechanical groups like Compressive Strength
4. Parameter Water Absorption

The following Figure 1 shows a flow chart how to find suitable test candidates, the representative products of all declared property groups.

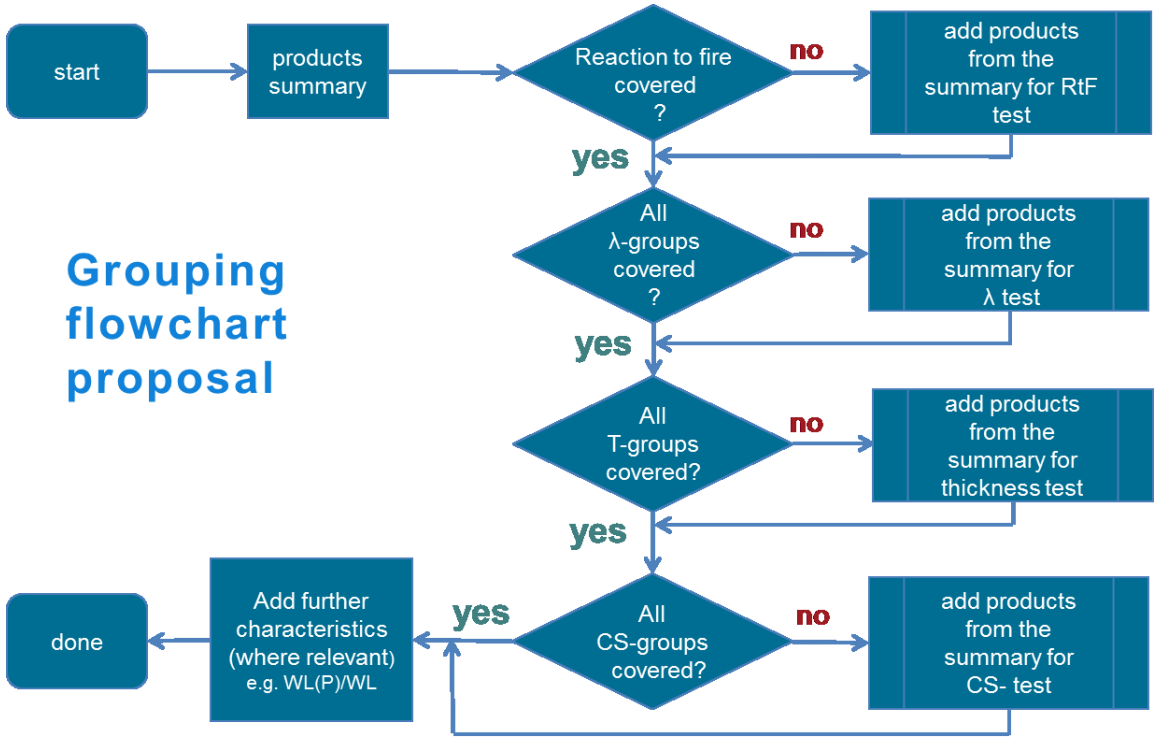

Figure 1: Flow chart to find suitable test candidates

The flow chart gives a general guidance for the certification body how to proceed with testing and certification in case of many different products. To add or skip rhombs gives the possibility to add or skip properties if necessary. Rectangular boxes represent an action to do. The action can be adapted to a specific insulation material or plant.

3.1 Grouping: Reaction to Fire

The property Reaction to Fire will lead according to table 4 to 3 different groups (A1 unfaced, A1 faced, A2-s1, d0 faced) and therefore 3 representative products shall be sampled.

Table 4: Example for product grouping Property by Property (Reaction to Fire)

Product	Form of delivery / Facings	Thermal Conductivity λ 10°C	Thickness range		Reaction to fire	Mechanical Properties CS / TR / PL
			Tolerance Class	mm		
1	Board / glass fleece, black, one-sided	0,035	T3	30 - 240	A1	-
2	Board / mineral fleece, white	0,040	T4	65 - 185	A2-s1, d0	CS(10)60-TR15-PL(5)600
3	Slab / none	0,040	T3	40 - 240	A1	-
Property Groups Reaction to Fire					3	

3.2 Grouping: Thermal Conductivity and Grouping Thickness Tolerances

The property Thermal conductivity will lead according to table 5 to 6 different Thermal Conductivity groups (0,032 / 0,033 / 0,035 / 0,036 / 0,040 / 0,045) and therefore 4 more representative products shall be sampled to cover all declared thermal conductivity groups and the 2 different Thickness Tolerances (T3 / T4).

Table 5: Example for product grouping Property by Property (Thermal Conductivity)

Product	Form if delivery / Facings	Thermal Conductivity λ 10°C	Thickness range		Reaction to fire	Mechanical Properties CS / TR / PL
			Tolerance Class	mm		
1	Board / glass fleece, black, one-sided	0,035	T3	30 - 240	A1	-
2	Board / mineral fleece, white	0,040	T4	65 - 185	A2-s1, d0	CS(10)60-TR15-PL(5)600
3	Slab / none	0,040	T3	40 - 240	A1	-
4	Slab / none	0,036	T4	60 - 180	A1	CS(10)50-TR5-PL(5)550
5	Board / glass fleece, natural, one-sided	0,032	T3	30 - 60	A1	CS(10)0,5-TR1
6	Board / glass fleece, black, one-sided	0,033	T3	60 - 200	A1	TR1
7	lamella, measured at 100 mm / none	0,045	T4	100	A1	CS(Y)60-TR90
Property Groups Thermal Conductivity / Thickness		6	2			

3.3 Grouping: Mechanical Properties

The grouping according to the mechanical properties (table 6) lead to an extra needed product (8) due to the fact that the property group CS(10)5 is not covered by the first 7 products.

Table 6: Example for product grouping Property by Property (Mechanical Properties)

Product	Form if delivery / Facings	Thermal Conductivity λ 10°C	Thickness range		Reaction to fire	Mechanical Properties CS / TR / PL
			Tolerance Class	mm		
1	Board / glass fleece, black, one-sided	0,035	T3	30 - 240	A1	-
2	Board / mineral fleece, white	0,040	T4	65 - 185	A2-s1, d0	CS(10)60-TR15-PL(5)600
3	Slab / none	0,040	T3	40 - 240	A1	-
4	Slab / none	0,036	T4	60 - 180	A1	CS(10)50-TR5-PL(5)550
5	Board / glass fleece, natural, one-sided	0,032	T3	30 - 60	A1	CS(10)0,5-TR1
6	Board / glass fleece, black, one-sided	0,033	T3	60 - 200	A1	TR1
7	lamella, measured at 100 mm / none	0,045	T4	100	A1	CS(Y)60-TR90
8	Board / none	0,040	T4	80 - 120	A1	CS(10)5-TR1

CS = Compressive stress or compressive strength
TR = Tensile strength perpendicular to faces
PL = Point Load

More products maybe are necessary to cover other properties like Dimensional Stability, Water Absorption and Air Flow Resistance groups. The 8 sampled and tested products are representative for all certified products (much more then sampled) because all declared property groups are covered during testing.

NOTE 1 The certification body shall always choose critical products to cover all non-critical products in respect of conflicting properties.

NOTE 2 During certification over years, every year different available products shall be tested.

NOTE 3 In case not every critical product has been tested during first testing in a year, second sampling is necessary.

NOTE 4 In case of non-conformity during product testing the same rules can be used for testing more than one product.

3.4 The Product-catalogue

Hereby, a more elaborated example of a product catalogue is presented, indicating the relevant product standard, the product names, the plant, the production lines, the certificate number and the several performances, for which in the relevant colors, the grouping is established, for which PTD/IT and audit testing is organized. Additional to the CE-tasks of the notified body, as part of the PTD, within the KEYMARK, all performances are to be tested externally. In case of the launch of a new product, or amended declared performances, the 3rd party activities of the CE-/DOP-marking can be taken into account. This catalogue shall be established per manufacturer and per EN-product standard. It shall be established at the beginning of the KEYMARK assessment and kept actual during the KEYMARK-validity.

Table 7: Example of a Product catalogue

EU Company 'AA -- ISOL" - PRODUCT CATALOGUE according EN131xxxx DRAFT 31-01-2018

Productcode	Designation Code	Keymark certification numberr	Validity (2 years)	Thickness (mm)	Productionlinnor	Thermal conductivity declared (mW/m.K)	Length (mm)	Width b (mm)	Thickness d (mm)	Squareness S (mm)	Flatness Smax (mm)	Dimensionstability DS (70,90) 48h,70°C-90% RH(%)	Point load PL (mm)	Reaction to fire	Compressive strength CS (kPa)	Bending strength BS (kPa)	Tensile strength perp. TR (kPa)	Compressive creep CC	Water abs. short WS (kg/m²)	Water abs. long WL (kg/m²)		
PLANT AAAA																					-	-
AA1	xyz-EN131xxxx-PL(P)2-DS(70,90)-CS(Y)200-BS450-TR150-WS-WL(P)-	123456-10	**-L1**	80-200	1	32	+/-2	+/-2	+/-2	5 mm/m / S_d	≤2	$\Delta\varepsilon_{l,b} \leq 0,5$ / $\Delta\varepsilon_d \leq 1$	≤2	A1	≥200	≥450	≥150	CC(1,5/1/50)100	≤0,5	≤0,5	-	-
AA235	xyz-EN131xxxx-PL(P)3-DS(70,90)-CS(Y)200-TR100-WS-WL(P)	123456-11	**-L1**	40-180	1	32	+/-2	+/-2	+/-2	$S_{l,b} \leq 5$ mm/m / S_d ≤2 mm	≤2	$\Delta\varepsilon_{l,b} \leq 0,5$ / $\Delta\varepsilon_d \leq 1$	≤3	A1	≥200	-	≥100	CC(1,5/1/50)100	≤0,5	≤0,5	-	-
AA235-FIX	xyz-EN131xxxx-PL(P)1,5-DS(70,90)-CS(Y)400-TR100-WS-WL(P)	123456-12	**-L1**	40-180	1	34	+/-2	+/-2	+/-2	$S_{l,b} \leq 5$ mm/m / S_d ≤2 mm	≤2	$\Delta\varepsilon_{l,b} \leq 0,5$ / $\Delta\varepsilon_d \leq 1$	≤1,5	E	≥400	-	≥100	CC(1,5/1/50)150	≤0,5	≤0,5	-	-
AA563	DS(70,90)-CS(Y)600-BS450-TR150-WS-WL(P)-CC(1,5/1/50)225	123456-13	**-L1-2**	40-180	1-2	36	+/-2	+/-2	+/-2	$S_{l,b} \leq 5$ mm/m / S_d ≤2 mm	≤2	$\Delta\varepsilon_{l,b} \leq 0,5$ / $\Delta\varepsilon_d \leq 1$	≤1,5	A1	≥600	≥450	≥150	CC(1,5/1/50)225	≤0,5	≤0,5	-	-
AA563*FIX	DS(70,90)-CS(Y)800-BS550-TR150-WS-WL(P)-CC(1,5/1/50)400	123456-14	**-L3**	40-160	3	45	+/-2	+/-2	+/-2	$S_{l,b} \leq 5$ mm/m / S_d ≤2 mm	≤2	$\Delta\varepsilon_{l,b} \leq 0,5$ / $\Delta\varepsilon_d \leq 1$	≤1	A1	≥800	≥550	≥150	CC(1,5/1/50)400	≤0,5	≤0,5	-	-
AA563-GL	DS(70,90)-CS(Y)1600-BS550-TR150-WS-WL(P)-CC(1,5/1/50)400	123456-15	**-L1-3**	40-160	1-3	45	+/-2	+/-2	+/-2	$S_{l,b} \leq 5$ mm/m / S_d ≤2 mm	≤2	$\Delta\varepsilon_{l,b} \leq 0,5$ / $\Delta\varepsilon_d \leq 1$	≤1	E	≥800	≥550	≥150	CC(1,5/1/50)400	≤0,5	≤0,5	-	-
AA563-GL1	DS(70,90)-CS(Y)800-BS550-TR150-WS-WL(P)-CC(1,5/1/50)400	123456-16	**-LA**	40-160	1-2-3	45	+/-2	+/-2	+/-2	$S_{l,b} \leq 5$ mm/m / S_d ≤2 mm	≤2	$\Delta\varepsilon_{l,b} \leq 0,5$ / $\Delta\varepsilon_d \leq 1$	≤1	E	≥800	≥550	≥150	CC(1,5/1/50)400	≤0,5	≤0,5		
PLANT BBBB																					-	-
BB1	xyz-EN131xxxx-PL(P)2-DS(70,90)-CS(Y)200-BS450-TR150-WS-WL(P)-	123456-10	**-L4**	80-200	4	32	+/-2	+/-2	+/-2	5 mm/m / S_d	≤2	$\Delta\varepsilon_{l,b} \leq 0,5$ / $\Delta\varepsilon_d \leq 1$	≤2	A1	≥200	≥450	≥150	CC(1,5/1/50)100	≤0,5	≤0,5	-	-
BB235	xyz-EN131xxxx-PL(P)3-DS(70,90)-CS(Y)200-TR150-WS-WL(P)-CC(1,5/1/50)100	123456-11	**-L4**	40-180	4	32	+/-2	+/-2	+/-2	$S_{l,b} \leq 5$ mm/m / S_d ≤2 mm	≤2	$\Delta\varepsilon_{l,b} \leq 0,5$ / $\Delta\varepsilon_d \leq 1$	≤3	A1	≥200	-	≥100	CC(1,5/1/50)100	≤0,5	≤0,5	-	-
	DS(70,90)-CS(Y)1600-BS550-TR150-WS-WL(P)-									$S_{l,b} \leq 5$ mm/m / S_d		$\Delta\varepsilon_{l,b} \leq 0,5$ /						CC(1,5/1				

In conjunction with table 7 of the Product catalogue table 8 presents the number of testing per IT-testing (line-level) and audit testing (plant-level). The below example presents on how both the manufacturer and the KEYMARK certification body have to decide on grouping of products and performances and consequently sampling for external testing.

It is reminded:

1. The number of tests corresponds to the number of test results for the final assessment on compliance. Per type of performance, to define a test result, several test specimens shall be taken, as defined in the corresponding for the KEYMARK-activities.
2. The frequency of audit-inspection is 2 per year/plant. The series of audit-testing is once per year, except for:
    - sound absorption ,
    - special characteristics without FPC requirements,
    - except for the reaction to fire, where the frequency shall be once every 2 years,
    - testing is agreed between parties,
    - compressive creep, where the frequency is according to the relevant product standard.
3. The number of product/performance-groups, indicated in the example, shall be seen as a minimum. This minimum & number of testing can be higher, depending on the nature of the product, the critical stages within the production process, the severity of the performance, the internal test evidence.
4. It is within the assessment and the provided evidence that a decision shall be taken between the manufacturer and the empowered certification body to agree upon the grouping & test campaigns.
5. Especially for the fire reaction, special care shall be taken in defining the number of groupings, taking into account all parameters in the production process and product name which influences the reaction to fire classification (e.g. types of facings, types of binders, fire retarders, fibers, blowing agent, type of raw material. Besides the agreement between the manufacturer and the empowered certification body, also the fire reaction classification report shall be aligned with the KEYMARK certificate.

Table 8: Number of testing per IT-testing (line-level) and audit testing (plant-level)

• ***Product-Type-Determination ITT*** • ***AUDIT TESTING***	***Line 1*** ***PLANT AA***	***Line 2*** ***PLANT AA***	***Line 3*** ***PLANT AA***	***Line 4*** ***PLANT BB***
1. Lambda **PTD/ITT - start**	**4 groups** 32-34-36-45 4*4 = 16 tests	**2 groups** 36-45 2*4 = 8 tests	**1 group** 45 1*4 = 4 tests	**2 groups** 32-45 2*4 = 8 tests
AUDIT testing per year	**4 groups** 32-34-36-45 1*4 = 4 tests			**2 groups** 32-45 1*2 = 2 tests
2. Dimensional stability DS(70/90) **PTD/ITT**	**1 group** **Δé≤0,5/1** 1*4 = 4 tests	**1 group** **Δé≤.0,5/1** 1*4 = 4 tests	**1 group** **Δé≤.0,5/1** 1*4 = 4 tests	**1 group** **Δé≤.0,5/1** 1*4 = 4 tests
AUDIT testing per year	**1 group** **Δé≤.0,5/1** 1*1 = 1 tests			**1 group** **Δé≤.0,5/1** 1*1 = 1 tests
3. Pointload **PTD/ITT**	**4 groups** 1-1.5-2-3 4*4 = 16 tests	**2 groups** 1 & 1.5 2*4 = 8 tests	**1 group** 1 1*4 = 4 tests	**3 groups** 1-2-3 3*4 = 12 tests
AUDIT testing per year	**4 groups** 1-1.5-2-3 4*1 = 4 tests			**3 groups** 1-2-3 3*1 = 3 tests
4. Fire reaction (°see point 3 of the introduction) **PTD/ITT**	**≥ 2 groups** A1-E 2*1 tests	**≥ 2 groups** A1-E 2*1 tests	**≥ 2 groups** A1-E 2*1 tests	**≥ 2 groups** A1-E 2*1 tests
AUDIT testing per 2 year	**≥ 2 groups** A1-E 2*1 tests			**≥ 2 groups** A1-E 2*1 tests
5. Compressive strength **PTD/ITT**	**4 groups** 200-400-600-800 4*4 = 16 tests	**2 groups** 600-800 2*4 = 8 tests	**1 group** 800 1*4 = 4 tests	**2 groups** 200-800 2*4 = 8 tests
AUDIT testing per year	**4 groups** 200-400-600-800 4*1 = 4 tests			**2 groups** 200-800 2*1 = 2 tests
6. Bending strength **PTD/ITT**	**2 groups** 450-550 2*4 = 8 tests	**2 groups** 450-550 2*4 = 8 tests	**1 group** 550 1*4 = 4 tests	**2 groups** 450-550 2*4 = 8 tests
AUDIT testing per year	**2 groups** 450-550 2*1 = 2 tests			**2 groups** 450-550 2*1 = 2 tests
7. Tensile strength **PTD/ITT**	**2 groups** 100-150 2*4 = 8 tests	**1 group** 150 1*4 = 4 tests	**1 group** 150 1*4 = 4 tests	**2 groups** 100-150 2*4 = 8 tests
AUDIT testing per year	**2 groups** 100-150 2*1 = 2 tests			**2 groups** 100-150 2*1 = 1 test
8. Creep **PTD/ITT**	**4 groups** 100-150-225-400 4*1 = 4 tests	**2 groups** 225-400 2*1 = 2 tests	**1 group** 400 1*1 = 1 tests	**2 groups** 100-400 2*1 = 2 tests
AUDIT testing per frequency of relevant product standard	**4 groups** 100-150-225-400 4*1 = 4 tests			**2 groups** 100-400 2*1 = 2 tests
9. Water abs short **PTD/ITT**	**1 group** 1*4 = 4 tests	**1 group** 1*4 = 4 tests	**1 group** 1*4 = 4 tests	**1 group** 1*4 = 4 tests
AUDIT testing per year	**1 group** 1*1 = 1 test			**1 group** 1*1 = 1 test
10. Water abs long **PTD/ITT**	**1 group** 1*4 = 4 tests	**1 group** 1*4 = 4 tests	**1 group** 1*4 = 4 tests	**1 group** 1*4 = 4 tests
AUDIT testing per year	**1 group** 1*1 = 1 test			**1 group** 1*1 = 1 test