Department for Business Innovation & Skills

TECHNICAL PAPER: SYSTEMATIC RATIONALE FOR MODIFICATION OF THE FURNITURE & FURNISHINGS (FIRE) (SAFETY) REGULATIONS IN RELATION TO SCHEDULES 4 & 5

OCTOBER 2014

Contents

Background

The effectiveness of the package of ignitability limiting measures imposed by the Furniture & Furnishings (Fire) (Safety) Regulations (As Amended) (from hereon in 'the Regulations') is well documented. However, since their introduction in 1988 and following the most significant amendment in 1989, they have not substantially changed. Due to subsequent significant reductions in domestic fires and fire deaths the Regulations have been hailed a huge success. Because of this, very little work has been done on identifying any weak elements in the Regulations, despite the fact they were somewhat rushed into existence.

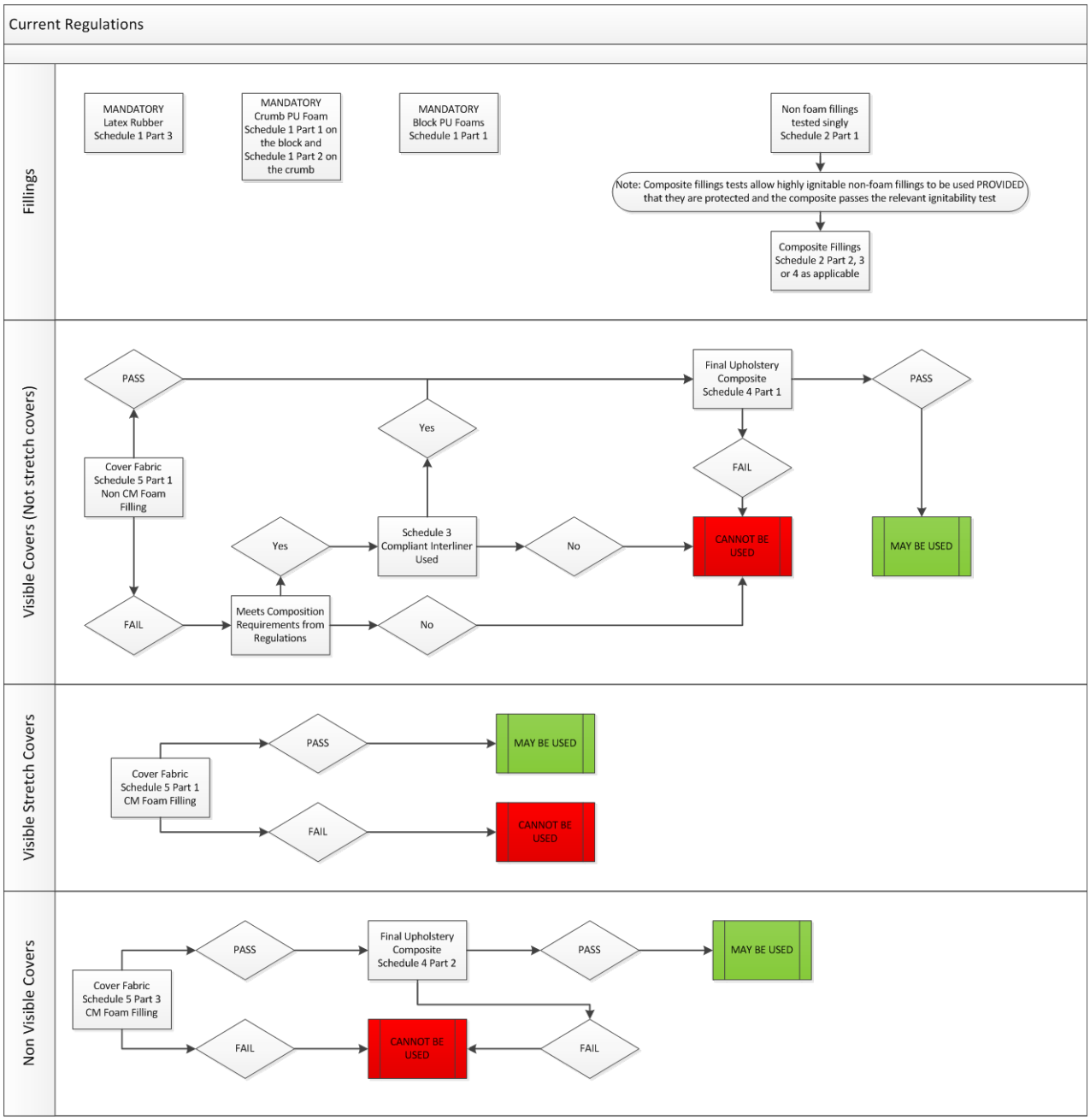
Most research on the Regulations has been towards clarifying interpretational issues or to demonstrate their effectiveness. Further work has been done on looking at completely different test criteria but such work seems to have invariably resulted in inconclusive findings.

Before suggesting any modifications to the Regulations a detailed analysis of the current requirements and an analytical dissection of the logic behind those measures is vital. This document, whilst somewhat narrative-based, will attempt to explain, with test results where necessary and appropriate, how the proposed changes will not just be as safe as the current requirements but will also provide some degree of additional protection to the consumer in many cases. This additional protection is not a theoretical environmental / health benefit weighed at the cost of fire safety but, as the following sections will outline, a clear reduction in the overall ignitability of the complete item of furniture when subject to small igniting flames. Resistance to larger sources of ignition, such as cribs and large gas flames, may also be marginally improved in some instances because with the proposed modifications, secondary (currently unregulated) ignitable items within the furniture will be subject to a simplified test which will ensure that ignitable components will be removed or protected.

The Current Requirements

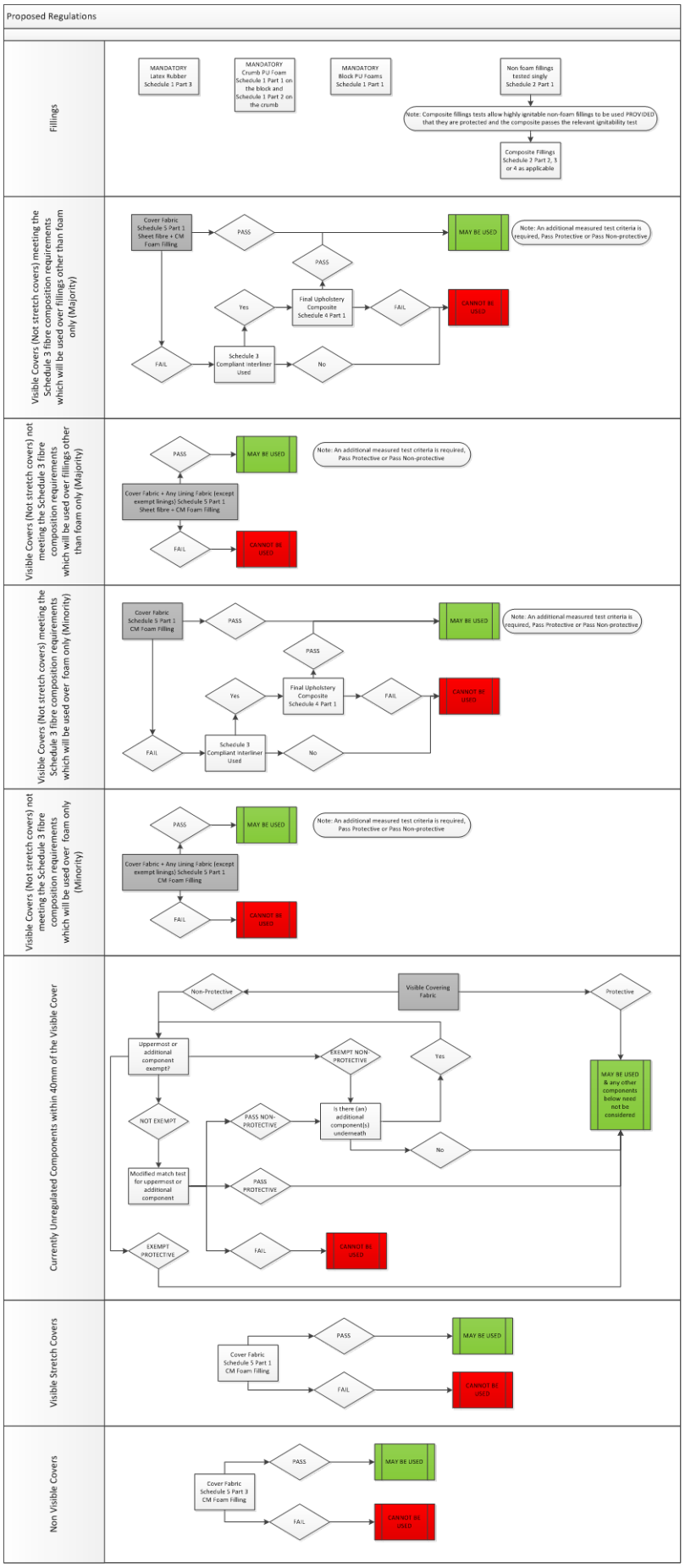
The Furniture & Furnishings (Fire) (Safety) Regulations impose several sets of ignition resistance requirements on certain elements of upholstered furniture. These elements and how they interact are outlined in the table and diagram below.

Element / Component	Schedule Reference	Test Requirement	Ignition Source (from BS 5852 Part 1 : 1979 or Part 2 : 1982
Polyurethane Foam in block or slab form	Schedule 1 Part 1	Modified Version of BS 5852 Part 2 : 1982. Additional weight loss criteria applies (60g loss max)	5
Polyurethane foam in chip or crumb form	Schedule 1 Part 2	Modified Version of BS 5852 Part 2 : 1982.	2
Latex Rubber Foam	Schedule 1 Part 3	Modified Version of BS 5852 Part 2 : 1982.	2
Non Foam fillings tested singly	Schedule 2 Part 1	Modified Version of BS 5852 Part 2 : 1982.	2
Composite fillings for other furniture	Schedule 2 Part 2	Modified Version of BS 5852 Part 2 : 1982.	2
Composite fillings test for pillows and cushions with protective covers	Schedule 2 Part 3	Modified Version of BS 5852 Part 2 : 1982.	2
Composite fillings test for mattresses & bed bases	Schedule 2 Part 4	Modified Version of BS 6807 : 1986.	2
Test For Interliner	Schedule 3	Modified Version of BS 5852 Part 2 : 1982	5
Cigarette resistance test for visible parts	Schedule 4 Part 1	Modified Version of BS 5852 Part 1 : 1979.	0
Cigarette resistance test for non-visible parts	Schedule 4 Part 2	Modified Version of BS 5852 Part 1 : 1979.	0
Match resistance test for visible covers	Schedule 5 Part 1	Modified Version of BS 5852 Part 1 : 1979.	1
Match resistance test for stretch covers	Schedule 5 Part 2	Modified Version of BS 5852 Part 1 : 1979.	1
Match resistance test for non-visible covers	Schedule 5 Part 3	Modified Version of BS 5852 Part 1 : 1979.	1


Current Regulations
Fillings
MANDATORY Latex Rubber Schedule 1 Part 3
MANDATORY Crumb PU Foam Schedule 1 Part 1 on the block and Schedule 1 Part 2 on the crumb
MANDATORY Block PU Foams Schedule 1 Part 1
Non foam fillings tested singly Schedule 2 Part 1
Note: Composite fillings tests allow highly ignitable non-foam fillings to be used PROVIDED that they are protected and the composite passes the relevant ignitability test
Composite Fillings Schedule 2 Part 2, 3 or 4 as applicable
Visible Covers (Not stretch covers)
PASS
Final Upholstery Composite Schedule 4 Part 1
PASS
Yes
Cover Fabric Schedule 5 Part 1 Non CM Foam Filling
FAIL
Yes
Schedule 3 Compliant Interliner Used
No
CANNOT BE USED
MAY BE USED
FAIL
Meets Composition Requirements from Regulations
No
Visible Stretch Covers
PASS
MAY BE USED
Cover Fabric Schedule 5 Part 1 CM Foam Filling
FAIL
CANNOT BE USED
Non Visible Covers
PASS
Final Upholstery Composite Schedule 4 Part 2
PASS
MAY BE USED
Cover Fabric Schedule 5 Part 3 CM Foam Filling
FAIL
CANNOT BE USED
FAIL

Proposed Changes

The proposed changes modify Schedule 4 & Schedule 5. The remaining schedules are unaffected. The diagram below outlines how the proposed changes interact with the current requirements:


Proposed Regulations
Fillings
MANDATORY Latex Rubber Schedule 1 Part 3
MANDATORY Crumb PU Foam Schedule 1 Part 1 on the block and Schedule 1 Part 2 on the crumb
MANDATORY Block PU Foams Schedule 1 Part 1
Non foam fillings tested singly Schedule 2 Part 1
Note: Composite fillings tests allow highly ignitable non-foam fillings to be used PROVIDED that they are protected and the composite passes the relevant ignitability test
Composite Fillings Schedule 2 Part 2, 3 or 4 as applicable
Visible Covers (Not stretch covers) meeting the Schedule 3 fibre composition requirements which will be used over fillings other than foam only (Majority)
Cover Fabric Schedule 5 Part 1 Sheet fibre + CM Foam Filling
PASS
MAY BE USED
Note: An additional measured test criteria is required, Pass Protective or Pass Non-protective
PASS
Yes
Final Upholstery Composite Schedule 4 Part 1
FAIL
CANNOT BE USED
FAIL
Schedule 3 Compliant interliner Used
No
Visible Covers (Not stretch covers) not meeting the Schedule 3 fibre composition requirements which will be used over fillings other than foam only (Majority)
PASS
MAY BE USED
Note: An additional measured test criteria is required, Pass Protective or Pass Non-protective
Cover Fabric + Any Lining Fabric (except exempt linings) Schedule 5 Part 1 Sheet fibre + CM Foam Filling
FAIL
CANNOT BE USED
Visible Covers (Not stretch covers) meeting the Schedule 3 fibre composition requirements which will be used over foam only (Minority)
Cover Fabric Schedule 5 Part 1 CM Foam Filling
PASS
MAY BE USED
Note: An additional measured test criteria is required, Pass Protective or Pass Non-protective
PASS
Yes
Final Upholstery Composite Schedule 4 Part 1
FAIL
CANNOT BE USED
FAIL
Schedule 3 Compliant interliner Used
No
Visible Covers (Not stretch covers) not meeting the Schedule 3 fibre composition requirements which will be used over foam only (Minority)
PASS
MAY BE USED
Note: An additional measured test criteria is required, Pass Protective or Pass Non-protective
Cover Fabric + Any Lining Fabric (except exempt linings) Schedule 5 Part 1 CM Foam Filling
FAIL
CANNOT BE USED
Currently Unregulated Components within 40mm of the Visible Cover
Visible Covering Fabric
Non-Protective
Protective
Uppermost or additional component exempt?
EXEMPT NON PROTECTIVE
Yes
MAY BE USED & any other components below need not be considered
NOT EXEMPT
PASS NON-PROTECTIVE
Is there (an) additional component(s) underneath
No
Modified match test for uppermost or additional component
PASS PROTECTIVE
EXEMPT PROTECTIVE
FAIL
CANNOT BE USED
Visible Stretch Covers
Cover Fabric Schedule 5 Part 1 CM Foam Filling
PASS
MAY BE USED
FAIL
CANNOT BE USED
Non Visible Covers
Cover Fabric Schedule 5 Part 3 CM Foam Filling
PASS
MAY BE USED
FAIL
CANNOT BE USED

Proposed Test Methods Comparison

It should be noted that the test method employed in the proposed changes is BS 5852 Part 1 : 1979, i.e. no entirely new test method has been developed; rather, the changes are a development of the existing test. Below is a table describing the existing test requirement (in detail) followed by a column indicating the new test requirement:

Component	Existing Test Method	Current Filling	New Test Method	Proposed Filling(s)
Covering Fabric	Modified BS 5852 Part 1:1979	Non-combustion modified polyurethane foam	Modified BS 5852 Part 1:1979	Combustion modified polyurethane foam + a 200 gram thermally bonded polyester fibre sheet
Upholstery Composite	Modified BS 5852 Part 1:1979	Actual Final Composite	Modified BS 5852 Part 1:1979 (Where required)	Actual Final Composite (Where required)
Materials within 40mm of the cover not subject to other parts of the Regulations	None	None	Modified BS 5852 Part 1:1979 (Where required)	Not required
Non-Visible Covers	Modified BS 5852 Part 1:1979	Combustion modified polyurethane foam	Modified BS 5852 Part 1:1979	Combustion modified polyurethane foam
Non-Visible Covers Upholstery Composite	Modified BS 5852 Part 1:1979	Actual Final Composite	None	None

Filling Material Specification

The following table details the filling specifications for the current tests and the proposed new tests:

Component Under Test	Current Filling Specification	Proposed Filling Specification
Visible Cover (Match Resistance)	Non-Fire Retardant foam complying with the specification of BS 3379: 1975 Type B (meaning block foam) 130 meaning an indentation hardness of between 115 – 150 N with a density of 20-22 kg/m^3	200g/m^2 Thermally bonded polyester sheet fibre that is compliant with Schedule 2 Part 1 to these Regulations and that has not been treated with a flame retardant and is of a thickness of 20mm ± 5mm. A melamine modified foam which passes the ignitability test in Schedule 1 Part 1 which has a density of 24-26 kg per m^3 and a hardness of 115-150N when determined using BS 3379.
Non-visible Covers (Match Resistance)	A foam which passes the ignitability test in Schedule 1 Part 1 and which has a density of 24—26 kg per m^3	A foam which passes the ignitability test in Schedule 1 Part 1 and which has a density of 24—26 kg per m^3.
Materials Within 40mm	N/A	No filling is required.

The consistency of the filling material as a test substrate is in line with previous specified filling materials in the Regulations. The test foam for the new visible covers match test has been specified to a greater degree than was previously required for non-visible covers for the purposes of consistency. However, the original non-visible cover test foam specification does not appear to have resulted in wide inter-laboratory variations. The new element which has been introduced is the thermally bonded polyester fibre. This could be specified much more tightly but this is unnecessary because the purpose of the inclusion of this fibre is to modify the physical set up of the test assembly. This modification is to simulate what is found in the majority of actual final furniture. Whilst there are additional fillings which may be used (such as feather and down or wool) the polyester acts as the most severe material, i.e.it rapidly melts and allows the cover to burn more as a suspended individual item (much like it does in actual final furniture where this kind of material is present). The inclusion of the fibre sheet also minimises the effect of the flame retardants contained in the combustion modified polyurethane foam, i.e. in the vast majority of cases (as evidenced in the Annex) any flaming for the allowable 2 minutes will not reach the foam in the test – unless the severity of the flaming is so great that a failure is inevitable.

Proposed Test Method Detail

Visible Covers Match Resistance

This test method is performed in an identical manner to the existing test save that the relevant new filling material is substituted for the current filling material.

Materials within 40mm

This test method modifies BS 5852 Part 1:1979 by utilising the back section of the test assembly only (the base is retained so that the back is perpendicular to the horizontal). The material(s) under test are pinned to the back of the test assembly and ignition source 1 is applied to the face of the material(s) which will be nearest to the outer surface of the furniture. This method may require laboratories to engineer test blocks so that the burner has a natural place of rest in front of the sample. However, this is not an uncommon practice - similar test blocks are commonly used for methods such as BS 7175. The pass/fail requirement in this instance has been modified such that any flaming past 10 seconds after the removal of the burner is considered a fail result. If an item is consumed within the test duration it should then be tested as a part of the final assembly in which it will be part of. Similarly, if the item is so small that it will inevitably have an exposed edge when tested in isolation (a spring clip for example), a similar approach may be adopted. If the item has an exposed edge in use then the result of the test with an exposed edge will be valid.

Additional Detail

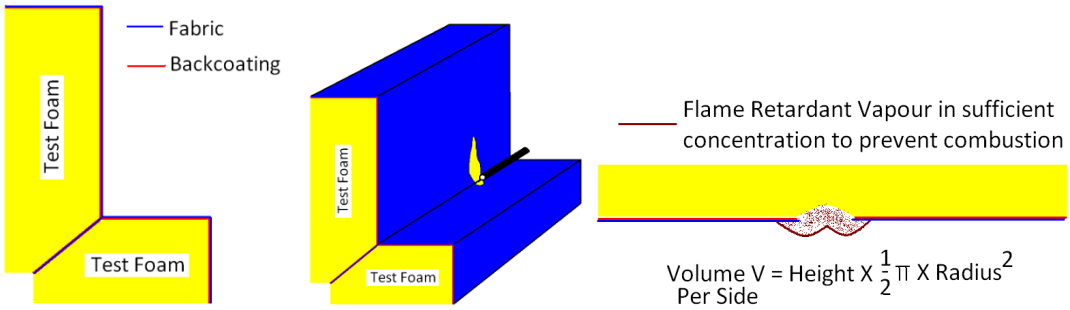
Some new terminology has been introduced which requires definition. The term ‘protective’ and ‘non-protective’ material, whether in respect of components within 40mm, covers and/or linings, means a material that, under the relevant test, does not form a hole. A ‘hole’ is defined as an area not containing material (whether it be char or the original substrate) bigger than 2mm². This concept is not new in textile fire testing and can be found (albeit with slightly different means of determination and dimensions) in numerous standards where a protective element is required eg. protective clothing standards such as BS EN 531, BS EN 532, BS EN 533 (withdrawn and replaced but which still form part of MOD specifications) etc.

Problems With The Current Schedule 5 Part 1 Match Test

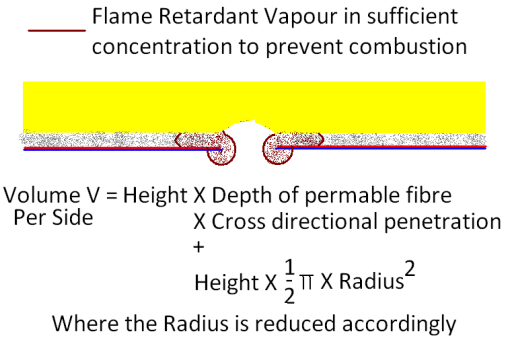
During the development of these changes, the effectiveness of the existing requirement was tested. Results of these tests are in the Annex. It became evident from this investigatory testing that the current test contains a particular physical setup which can produce results in contradiction to the principals on which the test is based. It is vitally important to understand that when the existing test regime was crafted the intention was that covering fabrics would resist ignition by two mechanisms: by being a) ignition resistant and b) protective of the materials underneath the cover. The following sections explore these mechanisms:

Ignition Resistance

Under the current test regime it is natural to expect that ignition resistance will be demonstrated simply by virtue of the fact that, when the ignition source is placed on the covering material (with an easily ignitable polyurethane foam behind it), the composite will make any potential ignitability of the cover manifest. Unfortunately, with the flame retardant technology employed this effect does not manifest for some fabrics. The problem occurs because of the physical set up of the test. The test foam, whilst being ignitable, does not have a particularly high level of vapour permeability, and when it is subject to the heat of a flame the melting effect on the surface level of the foam reduces that permeability even further. This results in the gas phase constituents of the activated flame retardant being forced out of the test assembly. If we assume that this vapour fills a particular volume – V - for any given amount of applied and activated flame retardant, we can visualise a model of the test assembly (the diagrams show the test assembly prior to test and also towards the later stages of the flame application) as follows:



The issue is that most modern furniture is not constructed with fabric laminated directly over foam with no gap between. The current common construction is to use a sheet of thermoplastic fibre (thermally bonded polyester fibre / Dacron) to give a smoother appearance to the furniture. Obviously, there are many variations with different types of fillings combinations (such as feathers/down, loose fibre, etc) but the common factor is that they all provide a less uniform surface for the fabric to rest against than foam. If we take the above material and add a sheet of thermally bonded sheet polyester fibre (for the sake of uniformity and to reflect current construction techniques) the composite under test is changed significantly. This results in a fundamental change in the distribution of the vapour phase element, outlined in the diagram below:



Obviously, this is a simplified example but the over-riding issue is the value of the radius of effect. Because we are dealing only with the ignitability of the material it is sensible to consider effects on the faces of the fabric. In this case it can be seen that the addition of the thermally bonded sheet fibre acts in a two fold manner: it serves to allow vapour phase element to flow behind the cover (something which is not possible in the intimate lamination required for the existing test) and also it melts away to expose the covering material to the possibility of a face and back combustion process (something which is also not possible in the normal intimate lamination that is required). Most materials, whether flame retardant treated or not, exhibit much greater rates of initial fire development when subject to material edge ignitions rather than material face ignitions. The above scenarios can be equated in the later stages of the flame application to the difference between a face ignition and an edge ignition. There is test evidence to show some materials which pass the current requirement actually fail when tested using a sheet of fibre and a combustion modified foam (see the Annex and video files and FIRA testing).

Protective of materials underneath the cover (barrier effect)

Under the current test regime, it was envisaged that because the covering material was tested over a ‘worst case’ non-combustion modified filling, the result would be that the cover would then offer protection to any other materials behind it. Using the same diagrams as detailed for the ignition resistance element, it is clear that the vapour permeability of the materials directly behind the cover have a significant effect on the radius of vapour phase element. In simple terms, a pass to the current test requires the radii to overlap; addition of the fibre wrap reduces the radii. It has been demonstrated that in actual final composites (with compliant fillings and compliant covers) additional components near to the cover (such as lining fabrics, support cloths and straps, etc) can result in total failure of the composite.

Other Factors

There are also several other factors creating issues with the Regulations, some of which are exclusively appertaining to the current visible covers match test. Dialogue with some trading standards officers and some laboratories testing for trading standards has revealed that there are issues with enforcement due to a perception of the current test. The difficulty arises in that the current test is perceived as ‘worst case’ and fails against the current criteria are being judged subjectively in respect of fabric or foam ignitions. This judgement, as has been demonstrated by the development work for the new test, is misleading as fabric post ignition behaviour is very much different in actual final composites than it is in the current test composite. The reason this view has prevailed is because numerous pass

certificates are normally available for any given fabric which fails at enforcement and this casts reasonable doubt on any possible prosecution.

Another area which creates problems is in respect of at what stage a component or piece of furniture must comply with the Regulations. Many appear to believe that the Regulations apply only to the first supplier of the virgin raw materials, which has led to widespread use of untested elements on finished furniture. These elements include silicon sprays to ease assembly or create a water resistant finish, and spray adhesives which are used in a variety of places in order to hold foam together or prevent fibres from slipping. These additional elements can have a catastrophic effect on the flammability of materials to which they are applied. When these elements are applied they are often in close proximity to the cover.

Consequences of the Problems

The issues outlined above result in two consequences for the Regulations:

It is possible to demonstrate in full scale tests that the Regulations are ineffective.

Consumers are, in many instances, being led to believe that the furniture they buy is match resistant when it is not so in its final form (because it has been sprayed by persistent and flammable materials or has covers which behave favourably in test but not in the finished item or has components near the surface which are flammable).

It must be remembered that the highest rating of ignition resistance in the Regulations is for polyurethane foam: ignition resistance to a crib 5 which has a maximum mass of 18g of combustible material. A typical lining cloth may weigh 200g per square meter; a webbing strap may weigh 90g - 150g. The Regulations rely upon a combination of ignition resistance measures; if any one of these measures is compromised it can lead to catastrophic failure of actual final composites.

How the Proposed Measures Correct the Problems

Ignition Resistance

The proposed changes modify the test method such that ignition resistance is assessed in conditions as close to an actual final composite as is possible, whilst also maintaining a controllable test filling. The ignition resistance of the cover therefore will be assured by the new test. The new test also acknowledges that covers may have lining fabrics behind them which can result in detrimental effects to the flammability performance and as such requires that, in certain circumstances, the cover is tested in combination with the lining fabric. The new test composite will reflect the actual burning behaviour of the final composite because of this similarity.

Protective of Materials Underneath the Cover (Barrier Effect)

The proposals acknowledge and accept that the primary cover can act as a barrier but also act to control circumstances where it is not. This is the criteria for the proposed measure of dealing with materials within 40mm, using the modified test. This acts as a screening test, to ensure there are not highly ignitable items in close proximity to non-protective covers.

Other Factors

In dialogue with some trading standards officers they have a very positive view of the new test requirements as the new test would allow them to ‘prove’ that the final item is unsafe and not subject to a ‘technical non-compliance’. The 40mm rule will also allow enforcement to look at additional elements such as silicon spray and spray adhesive in many cases where their effects would be the most detrimental.

Cigarette Resistance

In the proposed changes, cigarette resistance is assumed for match resistant covers; for covers used with Schedule 3 Interliners the test is maintained. The reason for dropping the cigarette requirement is because test laboratories have reported that historically match resistant covers do not fail the cigarette test. Whilst cigarette test failures are commonly observed over the non-combustion modified filling required for the current match test, it is extremely rare to see a cigarette test failure over compliant filling materials. The current cigarette test is supposed to be performed over the actual final composite; in practice, however, this is rarely the case: tests are normally performed over several stylised composites until the desired result is achieved.

It is possible to combine this change with the proposed change in match resistance despite the likely reduction in flame retardant usage because of the nature of covering materials. High natural/cellulosic fibre content materials (viscose, linen, cotton, etc) will present a smoulder risk. In the proposed match test these have not been demonstrated to achieve significant flame retardant treatment reductions (this was foreseeable as the majority of the flame retardant treatment is necessary to stop the cover itself from sustaining ignition). High thermoplastic fibre content materials (polyester, acrylic, nylon, etc) do not present a smoulder risk (because for smouldering to be progressive it must be able to pass from one fibre to the next and thermoplastic materials melt away before this can happen effectively) and it is with some of these that the largest reduction in treatment may be seen. For blended (thermoplastic / cellulosic) compositions, the thermoplastic element will melt and adhere to the cellulosic fibres. While this can promote flaming ignitions, it acts to smother smouldering ignition as the thermoplastic fibres fibres melt and stop the transfer of the smouldering.

There are some materials where smouldering (only in the cover) may be possible, such as some very fine suede leathers, but these failures are not very reproducible and the chance of a test detecting them consistently is low. The reduction in smoulder intensity of RIP cigarettes is documented (see NIST paper attached) and with this reduction in smoulder intensity it would in all likelihood prevent any failures in these other materials as the failures were already borderline using standard strength cigarettes.

Summary

Whilst the proposed changes initially appear more complex than the existing requirements, this is only because multiple paths to compliance are available. In time, most suppliers and manufacturers will choose specific routes which suite their production model and the process will be simple. The proposed changes will also correct many dysfunctional elements of the previous test, as have been detailed above, which have and continue to put consumers at risk. The proposed changes will also provide a more robust argument for prosecution with which trading standards can enforce the Regulations in a more rigorous manner, i.e. because the 'reasonable doubt' argument which is causing many prosecutions to fail will be removed.

Another fundamental approach that the proposed changes will promote is the design of fire safety into the product. This can be done with the careful use of protective materials and placement of components and represents a major change of approach for manufacturers since at present many consider compliance with the regulations to be an administrative exercise.

There are potential cost savings to be made from the reduction of certain brominated flame retardants in furniture, but the key benefit of the proposed changes is that they will rectify defined safety issues with the current test regime and provide the consumer the high level of ignition resistance in their furniture which they already expect.

Annex 1: Test Data

Air Permeability Values

Sample Description	Pressure Applied / Test Area	Flow Measured
20mm Thick PU (As Schedule 5 Part 1)	100Pa / 20cm²	64cm³/cm²/s
20mm Thick thermally bonded 200gsm sheet fibre	100Pa / 20cm²	322cm³/cm²/s

40mm Component Test Data Extract

Component	After flame (sec)	After glow (sec)	Smoke (sec)	Sample Consumed	Hole formation	Damage Length / Width (mm)	Resultant Classification
12mm Elastic	F.ext	-	-	Yes	Yes	Full	Easily Ignitable
13mm Aran Flangine Tape	Consumed in test	0	2	No	Yes	Full	Easily Ignitable
13mm Card Roll	F.ext - 20	-	-	Yes	Yes	Full	Easily Ignitable
150 Elastic Webbing	F.ext	-	-	Yes	Yes	Full	Easily Ignitable
350 Elastic Webbing	F.ext	-	-	Yes	Yes	Full	Easily Ignitable
Acrylic blend scrim	F.ext - 1min	-	-	Yes	Yes	Full	Easily Ignitable
Button Tag	Consumed in test	0	0	Yes	Yes	Full	Easily Ignitable
Buttoning Twine - Nylon	F.ext - 1min	-	-	Yes	Yes	Full	Easily Ignitable
Coir Fibre - Untreated	F.ext - 1min	-	-	Yes	N/A	Full	Easily Ignitable
Elasticated Webbing - Polypropylene / Nylon / Elastane	F.ext - 1min	-	-	Yes	Yes	Full	Easily Ignitable
F4 Weltine Cord	F.ext - 24	-	-	Yes	Yes	Full	Easily Ignitable
F8 Weltine Cord	F.ext - 26	-	-	Yes	Yes	Full	Easily Ignitable
Fir Tree Button	F.ext - 1min	-	-	Yes	Yes	Full	Easily Ignitable
Fleeced Poly	F.ext -	-	-	Yes	Yes	Full	Easily

Component	After flame (sec)	After glow (sec)	Smoke (sec)	Sample Consumed	Hole formation	Damage Length / Width (mm)	Resultant Classification
	1min						Ignitable
Hessian Cloth - Woven 265gsm	F.ext - 1min	-	-	Yes	Yes	Full	Easily Ignitable
Horsehair / coir fibre mix	F.ext - 1min	-	-	Yes	N/A	Full	Easily Ignitable
Horsehair fibre	F.ext - 1min	-	-	Yes	N/A	Full	Easily Ignitable
Mixed Wool / Cotton Felt Pad / Wadding	F.ext - 1min	-	-	Yes	Yes	Full	Easily Ignitable
Padattack	Consumed in test	0	13	No	No	Full adhesive pad	Easily Ignitable
Piping Cord - Paper	F.ext - 1min	-	-	Yes	Yes	Full	Easily Ignitable
Poly Webbing	F.ext - 1min	-	-	Yes	Yes	Full	Easily Ignitable
Polycotton Lining	1 min +	-	-	No	No	Full / 25	Easily Ignitable
Polyfoam Profile PF0009	F.ext - 1min	-	-	Yes	Yes	Full	Easily Ignitable
Polystyrene foam profile	F.ext - 1min	-	-	Yes	Yes	Full	Easily Ignitable
Polyviles (Valance Stiffener)	F.ext	-	-	Yes	Yes	Full	Easily Ignitable
Recycled textile fibre padding	F.ext - 1min	-	-	Yes	N/A	Full	Easily Ignitable
Recycled textile fibre padding 2	F.ext - 1min	-	-	Yes	N/A	Full	Easily Ignitable
Silent Wire	F.ext - 30	-	-	Yes	No	Full	Easily Ignitable
Sisal Twine	F.ext - 1min	-	-	Yes	Yes	Full	Easily Ignitable
Spring Clip	F.ext - 32	-	-	No	No	Full plastic part	Easily Ignitable
Valance Card - Blended Nonwoven Fibres	F.ext - 1min	-	-	Yes	Yes	Full	Easily Ignitable
Velcro Hook	F.ext + 1 min	-	-	No	Yes	Half / Full	Easily Ignitable
Velcro Hook/Loop combined	F.ext + 1 min	-	-	Yes	Yes	Full	Easily Ignitable
Component	Afterflame	After glow	Smoke	Sample	Hole form	Damage Length /	Resultant Classification

Component	After flame (sec)	After glow (sec)	Smoke (sec)	Sample Consumed	Hole formation	Damage Length / Width (mm)	Resultant Classification
	(sec)	(sec)	(sec)	Consumed	ation	Width (mm)	
Velcro Loop	F.ext + 1 min	-	-	No	Yes	Half / Full	Easily Ignitable
Woven Polypropylene Webbing	F.ext - 1min	-	-	Yes	N/A	Full	Easily Ignitable
Zip	Fext - 30	0	31	No	Yes	116 / Full	Easily Ignitable
20E Spun Bond Nonwoven	0	0	2	No	Yes	194 / 35	Not Easily Ignitable - Non Protective
5mm Foam Profile	0	0	5	No	Yes	79 / Full	Not Easily Ignitable - Non Protective
Black Polyester Tape	0	0	3	No	Yes	80 / Full	Not Easily Ignitable - Non Protective
Grey Polyester	4	0	5	No	Yes	144 / 94	Not Easily Ignitable - Non Protective
No4 Washable Cord	0	0	2	No	Yes	58 / Full	Not Easily Ignitable - Non Protective
Nylon Twine	0	0	0	No	Yes	120 / Full	Not Easily Ignitable - Non Protective
Polyester scrim	0	0	2	No	Yes	78 / 19	Not Easily Ignitable - Non Protective
Polypropylene nonwoven textile	0	0	2	No	Yes	155 / 37	Not Easily Ignitable - Non Protective
TB5 300 gsm Sofa Bed Pad	0	0	3	No	Yes	94 / 22	Not Easily Ignitable - Non

Component	After flame (sec)	After glow (sec)	Smoke (sec)	Sample Consumed	Hole formation	Damage Length / Width (mm)	Resultant Classification
							Protective
Velcro Hook - Brown Colour	0	0	3	No	Yes	54 / 13	Not Easily Ignitable - Non Protective
Velcro Loop - Brown Colour	0	0	3	No	Yes	57 / 14	Not Easily Ignitable - Non Protective
Woven Polypropylene Strip textile	0	0	3	No	Yes	104 / 26	Not Easily Ignitable - Non Protective
14mm Poro	0	0	4	No	No	70 / 15	Not Easily Ignitable - Protective
3/4 Inch Card Strip	0	0	0	No	No	60 / 11	Not Easily Ignitable - Protective
3mm Mill Board	0	0	0	No	No	80 / 11	Not Easily Ignitable - Protective
5mm PO Plastic Edge Section	5	0	11	No	No	89 / Full	Not Easily Ignitable - Protective
Aluminium Sheet - 1.2mm	0	0	0	No	No	0/0	Not Easily Ignitable - Protective
Beige / Brown PVC Type Tackroll	0	0	8	No	No	62 / 13	Not Easily Ignitable - Protective
Black Card - 2mm thick	0	0	2	No	No	58 / 11	Not Easily Ignitable - Protective
Black PVC Type Tackroll	0	0	8	No	No	68 / 15	Not Easily Ignitable - Protective
Bline Seam Profile	0	0	2	No	No	81 / Full	Not Easily Ignitable - Protective
Card - 1.5mm thick	0	0	0	No	No	69 / 13	Not Easily Ignitable - Protective
Copper Sheet - 1mm	0	0	0	No	No	0/0	Not Easily Ignitable -

Component	After flame (sec)	After glow (sec)	Smoke (sec)	Sample Consumed	Hole formation	Damage Length / Width (mm)	Resultant Classification
							Protective
Hardwood - Unspecified	0	0	2	No	No	56 / 12	Not Easily Ignitable - Protective
Off White PVC Type Tackroll	0	0	8	No	No	59 / 14	Not Easily Ignitable - Protective
Pinewood Panel 25mm Thick	0	0	2	No	No	52 / 12	Not Easily Ignitable - Protective
Plywood Panel 12.5mm Thick	0	0	2	No	No	41 / 11	Not Easily Ignitable - Protective
Steel Sheet - 1mm	0	0	0	No	No	0/0	Not Easily Ignitable - Protective
Tackroll - Medium Density Polystyrene	0	0	2	No	No	70 / 16	Not Easily Ignitable - Protective
Wool Felt - 200gsm	0	0	2	No	No	89 / 15	Not Easily Ignitable - Protective
Woven Cotton - Treated (approx 170gsm)	0	0	2	No	No	72 / 14	Not Easily Ignitable - Protective
Woven Jute Webbing (approx 750gsm)	0	0	2	No	No	62 / 14	Not Easily Ignitable - Protective
CARDBOARD	0	0	4	No	No	73 / 15	Not Easily Ignitable - Protective
METAL WIRE (BLACK PLASTIC)	0	0	7	No	No	56 / 4	Not Easily Ignitable - Protective
METAL CLIP (WHITE PLASTIC)	0	0	6	No	No	31 / 22	Not Easily Ignitable - Protective
WHITE FOAM STRIP	10 SEC +	-	-	No	Yes	-	Easily Ignitable
METAL SPIKE STRIP (+ PLASTIC)	0	-	8	No	No	76 / 12	Not Easily Ignitable – Protective
Component	Afterflame	After glow	Smoke	Sample	Hole form	Damage Length /	Resultant Classification

Component	After flame (sec)	After glow (sec)	Smoke (sec)	Sample Consumed	Hole formation	Damage Length / Width (mm)	Resultant Classification
	(sec)	(sec)	(sec)	Consumed	ation	Width (mm)	
WHITE PLASTIC CLIP	10 SEC +	-	/	Yes	Yes	Full	Easily Ignitable
METAL CLIP (WHITE PLASTIC)	0	-	6	No	No	34 / 22	Not Easily Ignitable - Protective
BEIGE STRAP	10 SEC +	-	/	Yes	Yes	Full	Easily Ignitable
BLACK + WHITE STRAP	0	-	6	No	No	67/14	Not Easily Ignitable - Protective
WHITE STRAP	10 SEC +	-	/	Yes	Yes	Full	Easily Ignitable
BLACK + CLEAR WOVEN FABRIC	10 SEC +	-	/	Yes	Yes	Full	Easily Ignitable
WHITE FOAM	10 SEC +	-	/	No	Yes	-	Easily Ignitable
BEIGE WIRE	10 SEC +	-	/	Yes	No	-	Easily Ignitable
BEIGE STRAP	0	0	8	No	No	64 / 19	Not Easily Ignitable - Protective
WHITE FOAM	0	0	6	No	No	101 / 18	Not Easily Ignitable - Protective
BLACK PLASTIC CLIP	10 SEC +	-	/	Yes	Yes	-	Easily Ignitable
WHITE ROPE	10 SEC +	-	/	Yes	Yes	-	Easily Ignitable
BLACK PLASTIC	0	0	3	No	No	76 / 15	Not Easily Ignitable - Protective
BLACK/CLEAR WOVEN FABRIC	10 SEC +	-	/	Yes	Yes	-	Easily Ignitable
BLACK STRAP	0	0	3	No	Yes	141 / 16	Not Easily

Component	After flame (sec)	After glow (sec)	Smoke (sec)	Sample Consumed	Hole formation	Damage Length / Width (mm)	Resultant Classification
							Ignitable - Non Protective
BLACK/GREEN STRAP	10 SEC +	-	/	Yes	Yes	-	Easily Ignitable
BLACK/GREEN STRAP	10 SEC +	-	/	Yes	Yes	-	Easily Ignitable
BEIGE VELCRO	10 SEC +	-	/	Yes	Yes	-	Easily Ignitable
BEIGE ZIP	5	-	/	No	Yes	/	Not Easily Ignitable - Non Protective
CARDBOARD	0	0	3	No	No	70 / 13	Not Easily Ignitable - Protective
BEIGE PLASTIC	10 SEC +	/	/	No	No	-	Easily Ignitable

Outer cover	FR Treated	Lining Fabric	FR Treated	Filling Type	Cover only result	Cover + Lining fabric result
100% Cotton	Yes	100% Cotton	No	Sheet Fibre + PU	Pass	Pass
100% Polyester	No	100% Cotton	No	Sheet Fibre + PU	Pass	Fail
100% Cotton	Yes	100% Polyester	No	Sheet Fibre + PU	Pass	Pass
100% Cotton	Yes	100% Cotton	No	PU	Pass	Pass
100% Polyester	No	100% Cotton	No	PU	Pass	Fail
100% Cotton	Yes	100% Polyester	No	PU	Pass	Pass

Cover Material Type	Material close to cover in composite	Filling Material	BS 5852 Test on Final Composite
100% Polyester	Hessian cloth	Loose fill polyester	Fail

Cover Material Type	Material close to cover in composite	Filling Material	BS 5852 Test on Final Composite
(Backcoated)	(Ignition in 40mm test)	(20Kg/m³)	
100% Polyester (Backcoated)	None	Loose fill polyester (20Kg/m³)	Pass
100% Polyester (Inherently Flame Retardant)	Hessian cloth (Ignition in 40mm test)	Loose fill polyester (20Kg/m³)	Fail
100% Polyester (Inherently Flame Retardant)	None	Loose fill polyester (20Kg/m³)	Pass

Reference Number	Fibre Composition	Schedule 5 Part 1 Result	Video File	Test Filling 1 Result	Video File	Test Filling 2 Result	Video File
A	75% Polyester, 25% Cotton	Pass	√	Pass NP	√	Fail	√
B	Polyester / Acrylic	Fail	√	Fail	√	Fail	√
C	100% Polyester	Fail	√	Pass NP	√	Pass NP	√
D	Pile: 100% Nylon, Base: 100% Polyester	Fail	√	Fail	√	Fail	√
E	Cotton / Acrylic / Polyester	Pass	√	Pass NP	√	Pass NP	√
F	Polyester / Acrylic / Cotton	Pass	√	Pass NP	√	Pass NP	√
G	Polyester / Cotton	Fail	√	Fail	√	Fail	√
H	100% Polyester	Pass	√	Pass NP	√	Pass NP	√
I	Polyester / Acrylic / Cotton / Viscose	Pass	√	Pass NP	√	Pass NP	√
J	Acrylic / Polyester	Fail	√	Pass NP	√	Pass NP	√
K	100% Polyester	Fail	√	Pass NP	√	Pass NP	√
L	Cotton / Polyester	Pass	√	Pass P	√	Pass NP	√

Annex 2 – additional notes

Current Test Aims:

1. To prove the cover is non-ignitable
2. To prove the cover can act as a barrier to ignition

Current test does not deliver both aims for all materials, if we classify materials into 4 sets this will outline where it fails and how.

Class	Ignition behaviour	Example
Thermoplastic	Melting	100% Polyester
Cellulosic	Creates Char	100% Cotton
Blends of Thermoplastic & Cellulosic	Melting onto char	75% Polyester, 25% Cotton
Hide / PVC	Char	Leather

The following table shows where evidence exists to prove dysfunctional element:

Material Class	Aim 1 - Ignitability	Aim 2 – Barrier Effect
Thermoplastic	Met	Not Met
Cellulosic	Met	Met
Blends of Thermoplastic & Cellulosic	Not Met	Not Met
Hide / PVC	Met	Met

Proposed Test:

Corrects ignitability issue with blended materials (large market share for mid range full size furniture items (3 piece suite)) as the new test composite is reflective of furniture construction.

Corrects barrier effect aims for thermoplastic (very large market share in budget full item furniture & smaller items (bean bags etc)) and blends of thermoplastic materials by monitoring formation of holes which can lead to flaming within the furniture and also by controlling ignitability of materials close to the cover.

Examples:

Current requirements

Cover: 75% Polyester, 25% Cotton – Passes current test requirement.

Filling: 100% Polyester sheet fibre wrap over combustion modified polyurethane foam. – Both pass current requirements.

Representing a typical back cushion in some furniture.

Actual Furniture: May ignite when subject to small match flame and result in a full furniture fire.

New Requirements

Representing a typical back cushion in some furniture.

Cover: 75% Polyester, 25% Cotton – Passes current test requirement

Filling: 100% Polyester sheet fibre wrap over combustion modified polyurethane foam. – Both pass current requirements.

Actual Furniture: Will not ignite when subject to small match flame and result in a full furniture fire.

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