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Distribution: Scania, Supplier

Master standards and standards for colours, textures and fabrics

Contents

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Changes from previous issue

This issue gives a more updated and correct version of the standard 4102. There are changes in many of the chapters, but adjustments has been done mostly in texts describing production, measuring and tolerance.

All text related to changes from previous issue are shaded.

Introduction

A system with master standards and standards is used when developing, manufacturing and assessing products with requirements for colour, texture and gloss. There are three different main types of standards: painted plate, plastic and textiles/leather/vinyl. Production, assessment of appearance and tolerances vary depending on type.

1 Scope

This standard give guidelines for master standards and standards for colours, textures and fabrics.

2 Definitions of Master standards and Standards

Master standards and Standards are physical references for a surface appearance. In most cases the only reference.

A Master standard is Scania's original standard which represents a definite appearance or specification. A master standard exists only in a single copy and must be stored at Scania for the purpose of preserving the original specification. It must never be removed from the prescribed storage premises. A master standard must only be used as a reference for a standard. There must always be a master standard for all standards which are used within Scania.

A Standard is a copy of a Scania master standard and must be used to secure an agreed specification between Scania and supplier. Standards are produced by Scania in requisite numbers of copies and are forwarded to the relevant production units within Scania and its suppliers. In discussion with suppliers, standards are also sometimes referred to as "master plaques".

There are variants of master standards / standards:

Table 1 – Definition of the different type of master standards / standards

Master standard		Standard		Description
TCM	Texture and Colour Master	TCS	Texture and Colour Standard	Plastic standard which is dyed and / or provided with texture. See chapter 4.
CM	Colour Master	CS	Colour Standard	Painted plate standard. See chapter 5.
CMM	Colour Measurement Master			
FM	Fabric Master	FS	Fabric Standard	Made of Textile, leather or vinyl. See chapter 6.

3 Texture and Colour Master (TCM) / Standard (TCS)

TCM/TCS can be produced in different ways. Most commonly they are injection moulded plastic plaques but can also be painted, chromed or applied with foil.

3.1 Production of TCM /TCS

TCM and TCS are produced in one material only. Regardless of the material of the part itself, it shall be matched with this standard.

Plastic standards are produced in several steps.

Different colours require different tolerances which are set by RCDS (C&T) together with the material supplier. This is done visually and can only be made after the colours have been combined with the correct textures. The texture will affect the colour impression. It is therefore important that the correct texture is used. It is the textured surfaces that the final parts will be matched to. Tolerances of colour and gloss are stated on the label attached to the reverse side of the standard. It is important to note that the tolerances stated on the TCM/TCS label applies for the final part against the TCS. For TCS to TCM and for the material itself the tolerances are less.

Colour tolerances are stated in the LCH system[1] or alternatively the Lab-system (depending on colour strength. Lab is usually preferred for weak colours).

TCM and TCS are produced simultaneously. All in the batch are measured according to the chosen colour system. The standard lying in the middle becomes the Scania master standard (TCM).

[1] LCH and Lab are standardized colour measuring systems developed by the International commission on illumination CIE (Commission internationale de l'éclairage).

The standards lying within one third of the permitted tolerances for this master standard become TCS and are marked for dispatch. It is the TCS which is referred to on the drawing and it is against the TCS the supplier makes the AAR (Appearance Approval Report - see STD4246). Everything outside one third of the tolerance is scrapped.

Since there can be several master standards in the same colour but with different textures, one is chosen as the master for the colour. This is stated on the PD.

The process of production of a TCM /TCS must be recorded in a protocol, see Appendix 2. This document shall contain all the important parameters which make it possible to reproduce a new TCS if the need should arise.

The protocol shall be sent to Scania digitally together with the standards and stored together with the master standard.

When developing an existing colour in a new material, the tolerance of 1/3 against the existing master standard applies (in order for the colour number to be the same).

TCM/TCS are referred to by unique part numbers. TCSs usually have underlying texture and colour no as well: TCS xxxxxxxx (with texture no xxxxxxxx and colour no xxxxxxxx)

3.2 Marking

TCM / TCS shall be marked with a label on the reverse side as follows:

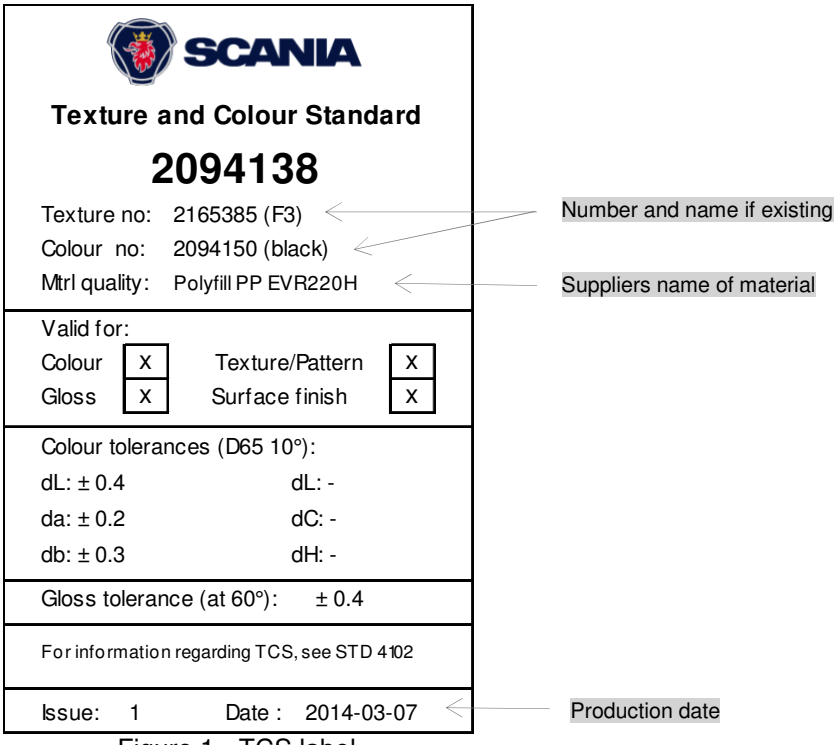

Figure 1 - TCS label

The Issue number is only changed when the appearance is changed. For reproductions with same appearance, only the production date is changed.

3.3 Measuring and validity

TCS are valid as long as they lie within the stated tolerance for the master standard, i.e. 1/3 of the complete tolerance span. All TCM shall be measured at arrival to Scania and the colour data stored in the Colibri® system. (These data will be used as the reference for all coming colour measurements).

All TCS are measured yearly, both colour and gloss. For TCS stored in the Scania archive, a minimum of five samples should be measured. If any of the three are not ok, a larger amount need to be controlled. The ones that doesn't lie within tolerance should be discarded.

Each TCS shall also be measured before distribution and then marked with an individual serial no.

The receiver shall measure the colour of the standard with their colour measurement instrument at arrival and store the value. As all absolute values are affected by the individual measuring device, it is vital that this is done. The initial colour value shall then be used for annual control of the colour drift. The colour deviation from initial value is maximum one third of the given tolerance. The result shall be recorded and shown to a Scania on demand. The measurement record shall include the date of the latest measurement, signature as well as potential deviations from tolerance values.

Colours shall be measured with a spectrophotometer configured with diffuse illumination (d/8), using 10° observation angle and specular gloss included (SCI).

Colour measurements are affected by texture and gloss. It is therefore important that it is always similar surfaces that are compared! (i.e. the same texture or same polishing level). Measurements are to a certain extent also affected by the aperture on the measuring device. As large an aperture as possible should always be used.

As the texture direction sometimes affects the measuring values, a series of measurements should be performed as follows:

Measure the plaque / part in four different areas with the device in the same direction. Turn the device (or plaque/part) 90° and perform four more measurements. Take the average from all eight measurements.

Gloss is measured on the textured part of the standard at an angle of 60 °.

Since measurements are affected by many parameters, a visual assessment in a lighting cabinet in accordance with ISO 3668, shall always be made as a complement.

This visual assessment is always decisive!

A standard must be replaced when it has been damaged, or in any other way, can be considered to have been exposed to abnormal influence.

Standards which shall be cancelled or exchanged according to directive from Scania must be cancelled by the holder who also shall confirm this in writing to Scania.

The standard shall only be used as a reference for appearance and not for material testing.

3.4 Appearance

Appearance of injection moulded plaques:

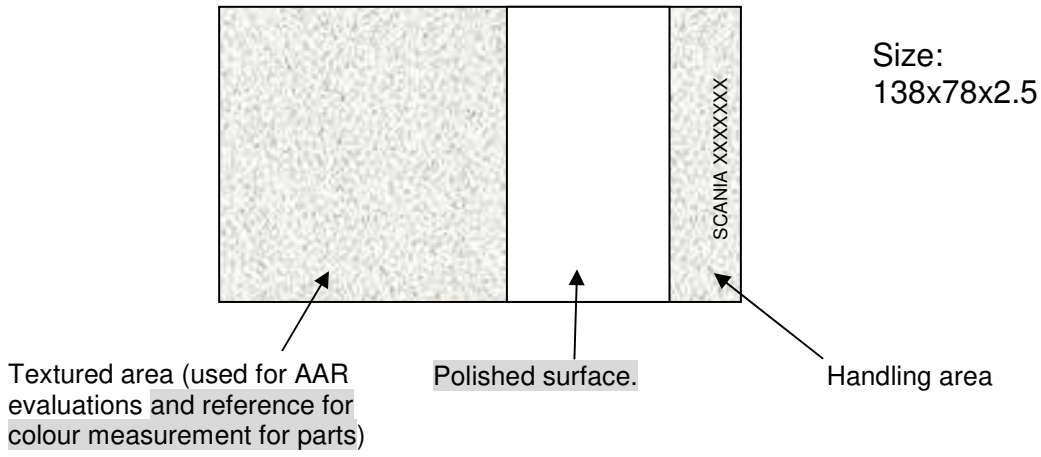

Figure 2 – Appearance of injection moulded TCM/TCS

Some TCS might have a different appearance due to different production methods or a limited application area when a part may be used as a TCS. There are also cases where the injection moulded plaques, with a texture, are painted.

4 Colour Master (CM) / Colour Measurement Master (CMM) / Standard (CS)

CM/CS are used as colour references for a variety of applications (interior- or exterior parts, finished painted parts (Scania specified) or customer ordered colours, solids or metallic). The development and tolerances for these differ slightly, as described in 5.1 below.

4.1 Production of CM / CMM / CS

CM/CS are produced for different reasons: new SRC colour (Scania Recommended Colour), new customer colour, carry-over, or a new issue of an existing colour.

Tolerances for CM/CS are stated in dE_{CMC}[2] (for exterior parts with uni-colour) and in LCH or Lab for other painted parts. Lab is usually preferred for colours with low chroma value and LCH for more saturated colours.

[2] dE_{CMC}, LCH and Lab are standardized colour measuring systems developed by the International commission on illumination CIE (Commission internationale de l'éclairage).

The following tolerances apply for production of CM/CS (uni-colours):

- Tolerances for new CM is in D65 dE_{cmc} <0,20 and in F11 dE_{cmc} <0,50 from original CM (the very first CM that has been produced, use stored measurement data).
- Tolerances for new CS is in D65 dE_{cmc} <0,10 and in F11 dE_{cmc} <0,50 from new CM.

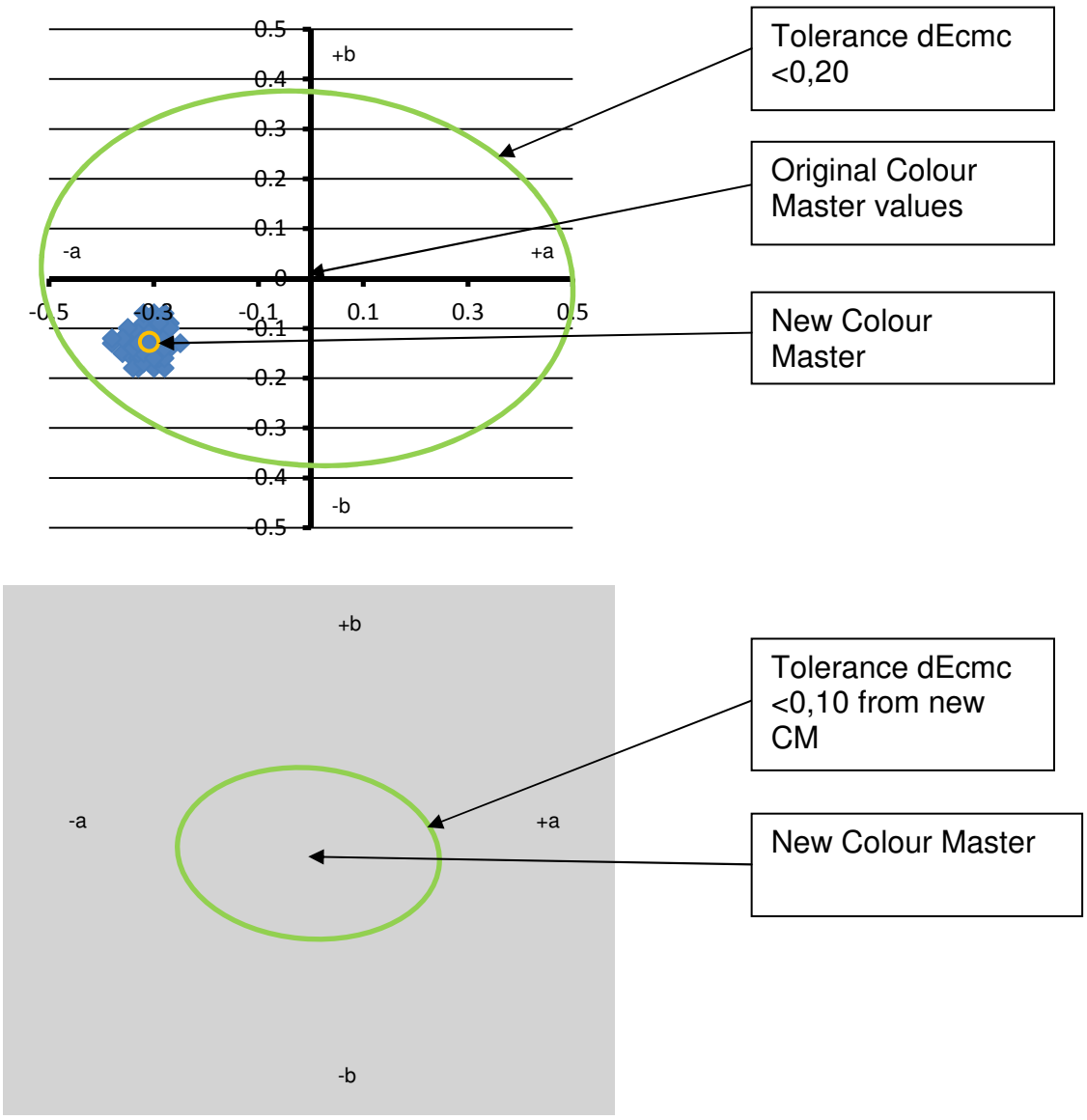

Figure 3 – Tolerance area for new CM to original CM and new CSs to new CM

The CSs that are closest to the new CM will be sent out to the prioritized subscribers and also kept as spare CSs for these subscribers.

If there are not enough CS below 0,10, CS with a tolerance up till 0,20 can be accepted, but only for non-prioritized subscribers.

All new CS are also visually checked against the new CM.

There will be no complement CS produced to existing CM. If we run out of CS in spare, there will be an order of a complete new set of CM and CS.

For metallic colours, the standards must not deviate more than 50% of the permitted tolerance spectrum from the given master. The tolerances are stated on the CM/CS.

The panel closest to the new colour master will be picked out as colour measurement master (CMM). This panel will be used in our colour measuring instruments, and also sent out to the involved suppliers. You can get different results in different measuring instruments so this is done to increase the accuracy of the measurements. When measuring the CMM shall there be 5 measurements on the panel, in the four corners and in the middle.

Gloss on uni-colours is measured in scale divisions according to ISO 2813:1999, at 60° angle. If gloss level is above 70 gloss units when measured at 60°, gloss shall be measured at 20° angle. If gloss is below 10 gloss units when measured at 60°, gloss shall be measured at 85° angle. Scania colour standard gives the requirements for gloss. Minimum gloss level for high gloss colours for cab and parts painted in customer ordered colour is 80 $^{+2}/_{-0}$ when measured at 20°.

On metallic colours the gloss is not measured often, but in those cases they are you should measure at 20°.

4.2 Measuring

When measured, the temperature of the panels shall be 23 ± 1°C.

Uni- are measured with a spectrophotometer configured with diffuse illumination (d/8), using 10° observation angle and specular gloss included (SCI). The colour deviation is given by ΔE, using CMC 1:1 and valid for all uni-colours, independently of colour shade.

Metallic colours shall be measured in D65 using a multi-angular spectrophotometer of the brand bykmac-i or instrument which gives comparable results.

When measuring metallic colour the colour measurement equipment bykmac-i shall be oriented as in figure 4. Measuring direction for metallic colours is also shown by an arrow on the label.

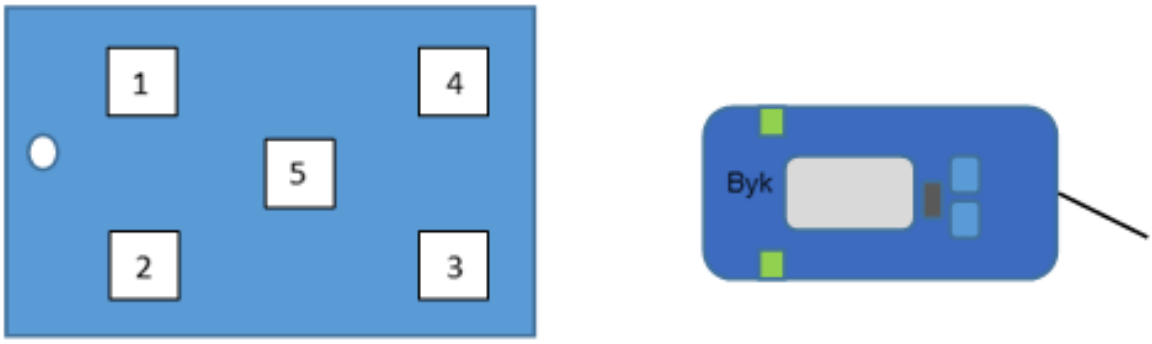

Figure 4 – Illustration of how to measure metallic colour with bykmac-i

Tolerances are given in delta-values of the numerical values L*, C*, h* for chromatic colours and L*; a*, b* for non-chromatic colours, calculated according to the “Audi2000-formula” from 2011 and forward. (Before 2011 the “Audi95-formula” was used.) This is done separately for each metallic colour.

The tolerance is given by the label on the colour master and colour standard for each colour.

4.3 Visual inspection

All inspections to be done in light cabinet. The viewing distance shall be 100 cm from front of panel to operator.

The panels shall be judged from 45° angle of object and 2mm distance between the panels.

4.4 Marking

CM/CS shall be marked with the designation Colour Master or Colour Standard, the part number, issue number, approval date and the issuer responsible. The CMM should be specially marked with *“CMM” on top of the label.*

On the label there is also the tolerances for the colour. There are different labels for uni-colours and metallics.

On CM/CS for uni-colours the measured values are stated on a small, separate label placed above the main label.

SCANIA

Colour Master, CM

Colour Solid ☒ Metallic ☐

ColourStandard No	Issue	ID No
1847979	1	0

Tolerance	Gloss
ΔE ≤ 0,5 CMC 1:1 D65 **ΔE ≤ 0,8 CMC 1:1 F11** Tolerance value is to be used when inspecting parts.	**80 min** According to ISO2813:1994 Garner 20°

Supplier No	Recipe No
6601	PPGWAC11847979
Date (YY-MM-DD)	Handled by
16-11-10	*MCEB A-H Quist*

Colour Standard, CS

Colour Solid ☒ Metallic ☐

ColourStandard No	Issue	ID No
1847979	1	4

Tolerance	Gloss
ΔE ≤ 0,5 CMC 1:1 D65 **ΔE ≤ 0,8 CMC 1:1 F11** Tolerance value is to be used when inspecting parts.	**80 min** According to ISO2813:1994 Garner 20°

Supplier No	Recipe No
6601	PPGWAC11847979
Date (YY-MM-DD)	Handled by
16-11-10	*MCEB A-H Quist*

Figure 5 – CM and CS label for uni-colours

For metallic colours the measured values are stated on the main label, see below:

Colour Master, CM

Colour		Solid		Metallic	X	
Colour Standard No			Meas.dir		Issue	ID No
2281070			↓		1	0

Gloss: 92 min According to ISO2813:1994 Garner 60°

Supplier No: 6601	Recipe No: WAC5KA2281070
Date (YY-MM-DD) 14-12-16	Handled by: MBCV Mattias Johansson

BATCH TOLERANCES

D65/10	dL	dC	dH	da	db	dE
15°	0,60			0,34	0,32	
25°	0,44			0,33	0,32	
45°	0,41			0,38	0,34	
75°	0,51			0,34	0,32	
110°	0,43			0,34	0,32	

PRODUCTION TOLERANCES

D65/10	dL	dC	dH	da	db	dE
15°	1,20			0,41	0,39	
25°	0,88			0,40	0,38	
45°	0,81			0,45	0,41	
75°	1,03			0,41	0,39	
110°	0,85			0,40	0,38	

COLOUR MEASUREMENT VALUES

D65/10	L	C	H	a	b
15°	7,46			0,27	0,04
25°	5,49			0,41	-0,02
45°	3,20			0,52	-0,12
75°	2,23			0,58	-0,25
110°	1,80			0,53	-0,31

Deviation from MASTER in Scania instrument

D65/10	dL	dC	dH	da	db
15°					
25°					
45°					
75°					
110°					

Colour Standard, CS

Colour		Solid		Metallic	X	
Colour Standard No			Meas.dir		Issue	ID No
2281070			↓		1	1

Gloss: 92 min According to ISO2813:1994 Garner 60°

Supplier No: 6601	Recipe No: WAC5KA2281070
Date (YY-MM-DD) 14-12-16	Handled by: MBCV Mattias Johansson

BATCH TOLERANCES

D65/10	dL	dC	dH	da	db	dE
15°	0,60			0,34	0,32	
25°	0,44			0,33	0,32	
45°	0,41			0,38	0,34	
75°	0,51			0,34	0,32	
110°	0,43			0,34	0,32	

PRODUCTION TOLERANCES

D65/10	dL	dC	dH	da	db	dE
15°	1,20			0,41	0,39	
25°	0,88			0,40	0,38	
45°	0,81			0,45	0,41	
75°	1,03			0,41	0,39	
110°	0,85			0,40	0,38	

COLOUR MEASUREMENT VALUES

D65/10	L	C	H	a	b
15°	7,51			0,27	-0,04
25°	5,36			0,50	-0,02
45°	3,21			0,54	-0,14
75°	2,26			0,57	-0,25
110°	1,81			0,52	-0,32

Deviation from MASTER in Scania instrument

D65/10	dL	dC	dH	da	db
15°	0,05			0,00	-0,09
25°	-0,13			0,09	-0,01
45°	0,01			0,02	-0,02
75°	0,03			-0,01	0,00
110°	0,00			0,00	-0,02

Figure 6 – CM and CS label for Metallic Colours

4.5 Validity

The receiver of CS is responsible that the standards initial colour value is measured and stored with its colour measurement instrument.

The initial colour value shall be used as reference for an annual check of colour drift.

If the standard deviates more than 0,20 in ΔECMC(1:1) from initial colour measurement the standard shall be replaced. The control is made with the same colour measurement instrument that was used for the initial colour measurement.

A standard shall also be inspected visually once a year, regarding gloss reduction, scratches and other damages that can affect the visual impression negatively when used for judging produced parts. If the standard is affected from handling it must be replaced via order to Scania.

The results from the annual control shall be documented and be presented on request from Scania. The documentation shall at least contain information about colour measurement equipment, date for control, colour drift in ΔECMC(1:1) as well as visual judgement.

For quality assurance in production, a labelling system that visually shows when the standard has been checked is recommended.

Standards used in the production may require more frequent controls than annually due to wear.

Standards which shall be cancelled or exchanged according to directive from Scania must be scrapped by the holder who also shall confirm this in writing to Scania.

5 Fabric Master (FM) / Standard (FS)

FS are soft standards produced in textile, leather or vinyl.

5.1 Production of FM / FS

When the requested appearance and quality is developed, the FS and FM shall be produced from the same batch. A sufficient number is produced to ensure the needs during the life cycle of the parts.

The appearance is approved (by C&T) with the assistance of visual assessment in a lighting cabinet in accordance with ISO 3668.

Colour and gloss measurement cannot normally be used for textiles or leather and vinyl that are not single coloured.

For uni-coloured leather and vinyl, measurements are applicable. The tolerances will be stated in Lab or LCH in the same way as for TCS.

When colour measurements are applicable, the FM shall be measured and the value stored in the Colibri® system and used as reference for coming measurements.

The process of production, approval and storage of a master standard must be recorded. This document shall contain all the important parameters which make it possible to produce a new FM / FS if the need should arise, see Appendix 2.

5.2 Marking

FM / FS shall be marked with the designation Fabric Master or Fabric Standard, the part number, issue as well as the date of approval. The label shall also refer to this standard, STD4102.

The label is placed in the lower right hand corner on the standard, according to drawing 1491041.

Figure 7 - FM / FS label

5.3 Validity

FM / FS are valid for 15 years after the date of approval.

Exception for leather that needs to be measured yearly to make sure the colour has not been affected by ageing!

A standard must be replaced when it has been damaged, or in any other way, can be considered to have been exposed to abnormal influence.

Standards which shall be cancelled or exchanged according to directive from Scania must be cancelled by the holder who also shall confirm this in writing to Scania.

5.4 Appearance

The FS are A4 pieces that has been cut out from the actual fabric or vinyl tolls or leather hides.

Textile, leather and vinyl FS:

Size:
A4

Figure 8 – Appearance of FS

6 Registration

Master standards and standards must be identified by the same part numbers.

Master standards and standards must be administered with part information and ECO. The identity code (Id-code) LI must be stated in the part information.

When a drawing refers to a standard, its part number must be registered in the part information as reference document in the information field "Document id".

The master standard and standard part numbers must be present in the structural information.

7 Storage and handling

A standard must be stored in a case and in such a way that it is not unnecessarily exposed to detrimental influence by external factors, e.g. light, heat or aggressive environments.

A standard shall be handled with care since finger prints and hand grease will affect its appearance. Use gloves when handling a master standard/standard.

All master standards and standards should be stored in a place which protects it against fire, theft, wear and environmental influence in such a way that the original appearance is preserved.

TCM/CM/FM shall be stored in a locked cabinet separated from the TCS/CS/FS.

8 Ordering of standards

Standards shall be regarded as a part of the technical documentation and can be ordered through the responsible purchaser.

The purchaser informs the archive administrator where the standards should be sent (supplier number/name, address and contact person) and how many.

For all CS, or TCS and FS that are related to the current production, contact MPCB in Oskarshamn. For ordering of TCS and FS that are related to the NCG project, send request to tcsfs.ordering@scania.com.

For the SLA market, external users shall order through Surface Treatment supervisor, SLA.

The final recipient of the standards shall be registered by the archive administrator. This is done to make sure that all suppliers have the latest issue of the standards.

9 Register of standards

A register of standards appears from the following tabular drawings:

2092134 - TCS (NCG interior)

2311121 – TCS (NCG exterior)

1484248 - Texture and colour standard

1369021 - Texture and colour standard (P4)

1366333 - Colour standard

1929347 - Colour standard front

1491041 - Fabric standard

2092133 – Fabric Standard (NCG)

The drawings for TCS NCG lists which texturing suppliers that are approved for each texture.

10 Indication on drawing

Reference to the part number of a master standard on the drawing shall be made according to the following:

For reference to a CS, see STD4111.

For reference to a TCS, use drawing label SV1268-103. See example below:

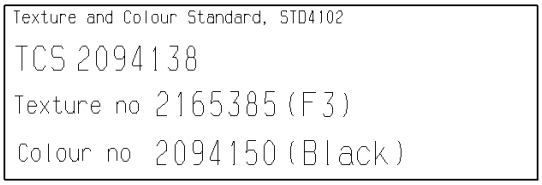

Figure 9 – TCS Catia lable

For FS, write reference FS xxxxxxx where there is room and it is most suitable

11 Appurtenant documents

The documents listed below supplement this standard and are necessary for the application of the standard.

The latest issue of the document applies when the issue has not been stated.

Table 2 – Appurtenant documents

Document designation	Issue	Title
STD4101	-	Painting - Surface appearance
STD4246	-	Scania appearance approval procedure
STD4314	-	Surface requirements - Plastic parts
ISO 2813	1994	Paint and varnishes - Determination of specular gloss of non-metallic paint films at 20°, 60° and 85°
ISO 3668	1998	Paint and varnishes - Visual comparison of the colour of paints

12 Appendix

Listed below are the appendix´s for this standard.

12.1 Appendix 1, Protocol for process parameters TCM /TCS

Process parameters: Scania Texture and Colour Standard For further information regarding standards, see STD 4102.	
TCS	
ECO	
Date of manufacturing	
Material / Supplier	/
Batch Number	
Colour	
Tolerances gloss and colour	See Scania STD 4314
Tool Number	
Injection machine	
Pre drying	____ hours_____°C
Cylinder temperature	°C
Tool temperature moving part	°C
Tool temperature fixed part	°C
Time of injection	sek
Post pressure	_____Bar / _____sek
Cooling time	sek

Date of approval	
Approved by	

12.2 Appendix 2, Protocol for process parameters FM /FS

The supplier may use their own product specification, but the following parameters must then be included.

Applies for textile standards:

Production parameters for Scania Fabric Standards For further information regarding standards, see **STD4102**	
FS	
Date of manufacturing	
Yarn/Fabric	
Chemical composition / Yarn supplier	/
Type of yarn(s)	
Yarn weight (dtex)	
Production method	
Machine type	
Gauge (needles/inch)	
Width, before finishing (mm)	
Finishing treatment (describe the sequence)	
Weight after finishing (g/m^2)	
Thickness after finishing (mm)	

Lamination

Foam, chemical composition	
Foam density (g/m^3)	
Foam thickness, before lamination (mm)	
Scrim, chemical composition	
Scrim weight (g/m^2)	

Final product

Weight (g/m^2)	
Thickness (mm)	
Width (mm)	

Supplier / Name / date	/ /
Signature	

Applies for Leather standards:

Production parameters for Scania Fabric Standards For further information regarding standards, see **STD 4102**	
FS	
Date of manufacturing	

Leather

Leather type	
Treatments (e.g. tanning, dyeing, …) and their chemical composition	

Final product

Weight (g/m^2)	
Thickness (mm)	
Hide size (m^2)	

Supplier / Name / date	/ /
Signature	

Applies for vinyl standards:

Production parameters for Scania Fabric Standards For further information regarding standards, see **STD4102**	
FS	
Date of manufacturing	

Vinyl

Chemical composition / Supplier	/
Production steps	
Width (mm)	
Thickness (mm)	

Lamination

Foam, chemical composition	
Foam density (g/m^3)	
Foam thickness, before lamination (mm)	
Scrim, chemical composition	
Scrim weight (g/m^2)	

Final product

Weight (g/m^2)	
Thickness (mm)	
Width (mm)	

Supplier / Name / date	/ /
Signature	