Example - ISO 16232 - metallic - Ford fibers 09Nov2015L

Lab: Crown Clean Technology Laboratory; 2070 Brooklyn Road; Jackson, MI 49203 USA 517-905-5328

Reference:	Example - ISO 16232 - metallic - Ford fibers 09Nov2015L
Control :	Example
Operator:	JF - Gravimetry / JG - Microscopy
Notes:	Pressure rinse extraction @50-55psi with approx. 2,000ml U.S.+ (2 passes over all surfaces)
Sampled on :	12/8/2015 07:53
Study file:	C:\Results - Studies\Example no company name\ISO 16232 - metallic - Ford Fiber definition 9N
Date of study:	12/8/2015
Part area :	6.330324 cm² (50 parts)

Additional information

Gravimetry :	0.22mg per batch of 50 parts = 0.0044mg/part/average
Gravimetric Limit :	0.06mg per part // 7.33% of allowable Mass Limit
Gravimetry/1000cm2 :	0.695mg/1000cm2
Filter Membrane Used :	10um Nylon Net (white paper under slide during scan)
Scan Lighting :	TL BF // int 52.8% // 5x // exp 10.0ms // avg PF LUM 94 (60% Dark Thresholding)
Photo LIghting :	IL DF - as needed for picture quality
Luminosity Target :	93 +/- 5

Operation settings

Objective :	5x (0.8789 µm/pixel)
Scanning diameter :	45.0 mm
Modelization :	Standard
Optical properties :	Measured
Dark - Thresholding :	Fixed - 0 to 64
Dark - Filtering :	Macro - Closing (3) - Filling - Opening (3)
Dark - Criteria :	2 criteria - Length >= 15.0 µm - And : Width >= 10.0 µm
Adaptive Dark - Thresholding :	Adaptative - Dark shades - Maximum diameter: 14.9 µm - Minimum contrast: 40
Adaptive Dark - Filtering :	Macro - Closing (1) - Filling - Opening (1)
Adaptive Dark - Criteria :	2 criteria - Length >= 15.0 µm - And : Width >= 10.0 µm

This report shows a Qualified Calibration Factor being used - 17 pixels will fit into longest axis of smallest particle being measured. ISO 16232 requires a minimum of 5 pixels fitting into smallest particle under 20micron being measured OR at least 10 pixels fitting into particles 20 micron or larger which are being measured.
~Jack Griffes, Laboratory Operations Manager

Ford Fibers

Ford Fibers		
Class	**Particle count**	**Standardized count (1)**
<= 3000 µm	27	85.3
Total	27	85.3
incl. Ford Fibers (2)	27	85.3

(1) 50 parts of area 6.330324 cm² reported to 1000 cm².
(2) Ford Fibers : length <= 3000 µm and lengthening (L/w) > 15.0 and width <= 40.0 µm.

Particles of all Types (excluding Ford Fibers)

ISO 16232 (C-E15/F-G10/H-I4/J-K00)					
Class	**Particle count**	**Standardized count (1)**	**Cleanliness level (2)**	**Specification limit (2)**	**Conformity**
15 - 100 µm (C-E)	5246	16574.2	15	32000 (15)	C
100 - 200 µm (F-G)	175	552.9	10	1000 (10)	C
200 - 600 µm (H-I)	20	63.2	6	16 (4)	NC
>= 600 µm (J-K)	3	9.5	4	0 (00)	NC
Total	5444	17199.8			
incl. Metallic (3)	1435	4533.7			
incl. Balled Fibers (4)	1	3.2			

CCC : A(C-E15/F-G10/H-I6/J-K4)

Sample : non-conform

(1) 50 parts of area 6.330324 cm² reported to 1000 cm².
(2) Related to standardized count.
(3) Metallic : length > 15.0 µm and luster <= 20.0 % and intensity <= 20.0 % and hue] 240 ; 350] °.
(4) Balled Fibers : undefined.

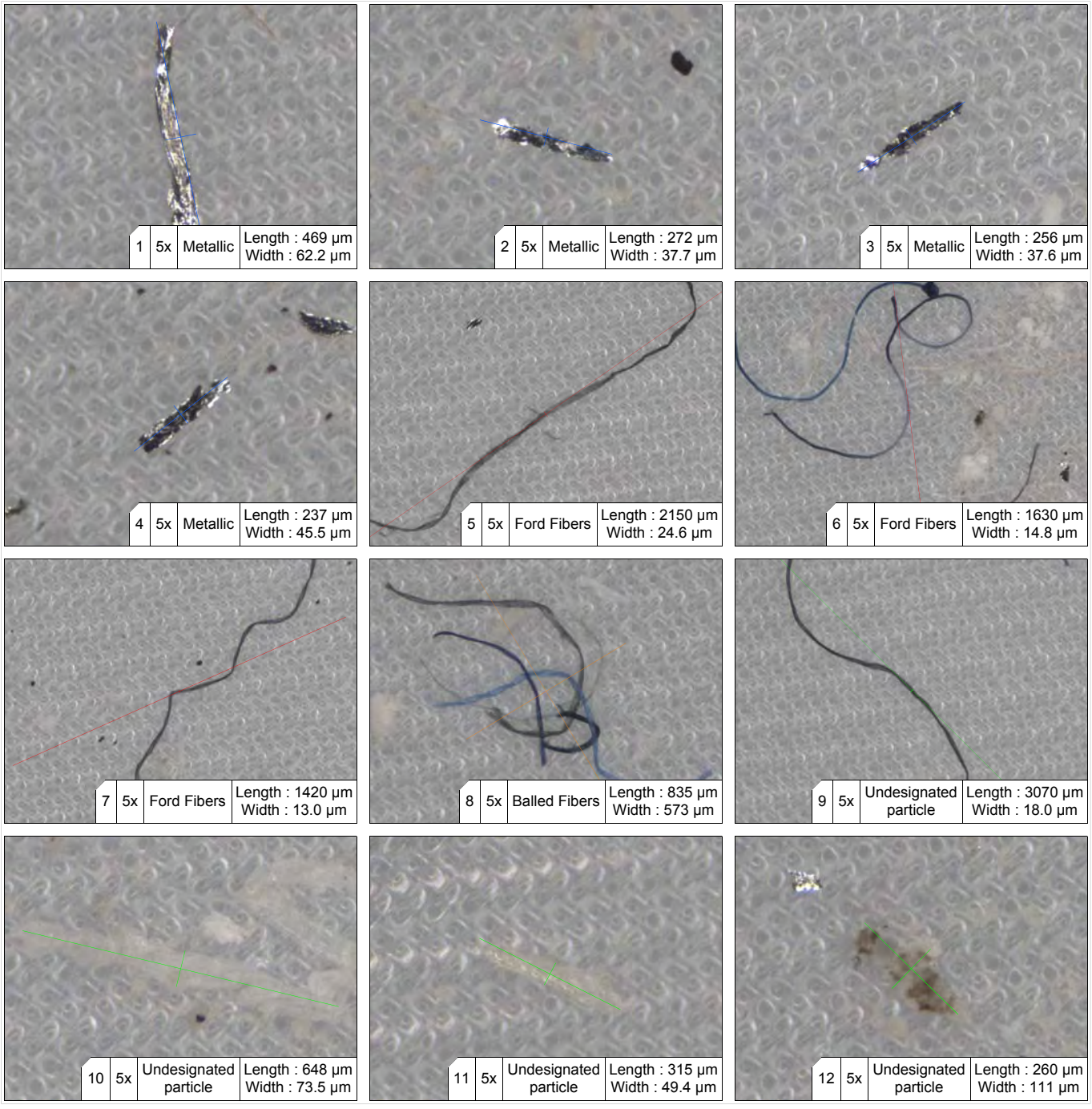
Metallic Particles (as discerned by optical properties)

ISO 16232 (C-E15/F-G10/H-I4/J-K00)			
Class	**Particle count**	**Standardized count (1)**	**Cleanliness level (2)**
15 - 100 µm (C-E)	1347	4255.7	13
100 - 200 µm (F-G)	77	243.3	8
200 - 600 µm (H-I)	11	34.8	6
>= 600 µm (J-K)	0	0.0	00
Total	1435	4533.7	
incl. Metallic (3)	1435	4533.7	

CCC : A(C-E13/F-G8/H-I6/J-K00)

(1) 50 parts of area 6.330324 cm² reported to 1000 cm².
(2) Related to standardized count.
(3) Metallic : length > 15.0 µm and luster <= 20.0 % and intensity <= 20.0 % and hue] 240 ; 350] °.

Portfolio compare the difference in photo quality and data given between the two example reports ~JG



This is the final page of the ISO compliant example report.

Next, for educational purposes, I will show you an example of a non-compliant report - with confidential info removed.

When you get done I hope you are able to clearly tell if a microscope system or a lab report is or is not using a ISO 16232 compliant Calibration Factor or Scale or Pixel Resolution for all the particle sizes measured and counted. ~JG

The company logo showing who performed this non-compliant test was removed from the top of each page as a professional courtesy.
Red font on this report was added by Jack Griffes for educational purposes.

Analisi-Nr/Analyse-Nr: 420

Dati tecnici di pulizia secondo ISO 16232 / VDA Bd. 19
Restschmutz-Auswertung nach ISO 16232 / JOMESA Messsysteme GmbH

Campione / Prüfgegenstand	
Cliente / Kunde:	**Automotive OEM (name removed)**
Denominazione / Bauteil:	High Pressure Fuel Pump (not full name)
Disegno-Nr./ Bautei-Nr.:	(number removed for confidentiality)
Indice di modifica / Zeichnungsstand:	001
Campione-Nr. / Proben-Nr.:	1 com. 013-11 pezzo lavato in USA
Luogo del prelievo / Entnahmeort:	Magazzino / Lager
Data del prelievo / Entnahmedatum:	22/02/2012
Esaminatore / Prüfer:	P.G.C.
Data dell'analisi / Prüfdatum:	22/02/2012

Metodo del prelievo / Verfahren:	**Parametri / Parameter**	
Immersione / Tauchen (I/T), Lavaggio / Spülen (L/S), Risciacquo / Nachspülen (R/N)	Liquido del prelievo/Spülflüssigkeit:	De-solv-it 1000
	Quantità di liquido / Spülvolumen [ml]:	(I/T) 6000ml (L/S) 3600ml (R/N) 3600ml
	Pressione sistema / Spüldruck [bar]:	3,4 bar
	Portata all'ugello / Volumenstrom [ml/min]:	2000 ml/min 1000ml/min
	Tipo di Filtro / Membrantyp:	Polyamid / Polyamid (15µm)
Area analizzata / Prüfbereich:	counts should not start at 5um when a 15um filter membrane/patch is used ~JG	
Intero pezzo / Gesamt	Superficie del componente / Oberfläche Bauteil [cm²]:	335
	Campioni per analisi / Anzahl Bauteile pro Analyse	1

Analisi gravimetrica / Gravimetrie	
Peso del residuo sul filtro [mg]: Restschmutz am Bauteil [mg]:	8,39 mg

Normative richieste / Spezifikation:

(spec number removed for confidentiality)

	Valore Nominale / Sollwert:	**Valore Effettivo / Istwert:**
Peso del residuo consentito / erlaubtes Gewicht **[mg/1000cm²]**:	4	25,04
Peso del residuo consentito / erlaubtes Gewicht **[pro Bauteil]**:	1,34	8,39
Dimensione max ammessa delle particelle metalliche **[µm]**: Max.zul.metallischer Partikel **[µm]**:	600	1861
Particelle metalliche consentite / metallische Partikel 200 – 400 µm:		2
Particelle metalliche consentite / metallische Partikel 400 – 600 µm:	2,68	0

Risultato / Ergebnis

Non conforme / nicht in Ordnung

This report was generated in Europe where the custom is to use a comma where people in the USA use a decimal point. That is important to remember as you look at numbers in the report. ~JG

Analisi microscopica / Mikroskopische Analyse			
Scale: Massstab:	X:6,2 µm/Pxl Y:6,2 µm/Pxl Qualified for 62micron & above	Diametro di valutazione [mm]: Auswertedurchmesser [mm]:	44,0 ~JG

yet measurement and counting starts at 5micron - report is non-compliant with ISO 16232 calibration factor requirement

Particella metallica più grande Grösster metallischer Partikel	Lunghezza[µm] Länge [µm]	1861	Larghezza [µm] Breite [µm]	1731
Particella non metallica più grande [1] Grösster nichtmetallischer Partikel [1]	Lunghezza[µm] Länge [µm]	709	Larghezza [µm] Breite [µm]	292

Particelle di fibra[2] Faserige Anteile[2]	Lunghezza della fibra più lunga [µm]: Länge der grössten Faser [µm]:	511	Lunghezza totale delle fibre [mm]: Gesamtlänge Fasern [mm]:	5,25

		Numero di particelle sul filtro[1] Partikelanzahl auf Filtermembran[1]		Numero di particelle per campione[1] Partikelanzahl pro Bauteil[1]		Numero di particelle [1] per 1000 cm² Partikelanzahl [1] pro 1000 cm²	
Dimensione Partikelgrosse [µm]	Codice Code	Totale[1] Insgesamt[1]	Metallica Metallisch	Totale[1] Insgesamt[1]	Metallica Metallisch	Totale[1] Insgesamt[1]	Metallica Metallisch
Riepilogo dei risultati / Zusammengefasste Statistk:							
> 600	J-K	2	1	2,0	1,0	6,0	3,0
100 - 600	F-I	69	26	69,0	26,0	206,0	77,6
15 - 100	C-E	2891	244	2891,0	244,0	8629,9	728,4
Dettaglio dei risultati / Ausführliche Statistik:							
> 1000	K	1	1	1,0	1,0	3,0	3,0
600 - 1000	J	1	0	1,0	0,0	3,0	0,0
400 - 600	I	1	0	1,0	0,0	3,0	0,0
200 - 400	H	6	2	6,0	2,0	17,9	6,0
150 - 200	G	13	2	13,0	2,0	38,8	6,0
100 - 150	F	49	22	49,0	22,0	146,3	65,7
50 -100	E	529	148	529,0	148,0	1579,1	441,8
25- 50	D	1466	88	1466,0	88,0	4376,1	262,7
15 - 25	C	896	8	896,0	8,0	2674,6	23,9
5 - 15	B	1355	2	1355,0	2,0	4044,8	6,0

CCC[1] (Codice di pulizia dei componenti / Component Cleanliness Code):

A(B13/C-E14/F-I8/J-K3)
A(B13/C12/D13/E11/F8/G6/H5/I2/J2/K2)

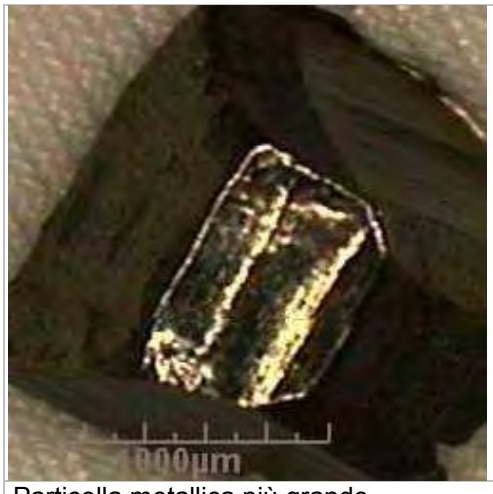
[1]: Particelle senza fibre / Nichtmetallische Partikel ohne Faser gezählt
[2]: Definizione di fibre non metalliche, compattezza < 30 % o lunghezza diviso larghezza > 10.
Definition Faser: Kompaktheil < 30 % oder Länge/Breite > 10.

Commenti / Bemerkungen:

Since the Calibration Factor or Scale used to do this test/study only qualifies under ISO 16232 as accurate enough to measure 62micron and larger particles that means all the red font particle count data on this report is out of compliance. It is not within the defined accuracy standards required on a ISO 16232 report. With 6.2microns/pixel as the Scale or Calibration Factor used on this report consider the accuracy involved measuring particles only 5microns in size as this report purportedly is doing. How can you accurately measure when your unit of measure is actually larger than what you claim to be measuring? So remember that ISO 16232 requires 10 or more pixels to fit in the length of the smallest particle 20micron or larger which you are measuring or having a Lab measure for you. IF you are measuring particles smaller than 20micron then ISO 16232 requires 5 or more pixels to fit in the length of the smallest particle you are measuring.

Jack Griffes; Laboratory Operations Manager; Crown Industrial Services; Jackson, Michigan, USA

Immagini / Bildmaterial

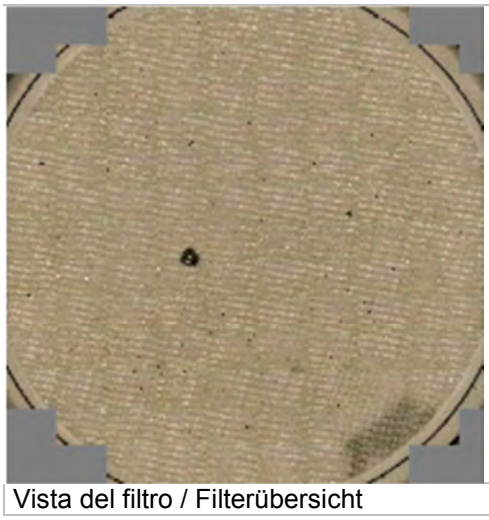


Particella metallica più grande
Grösster metallischer Partikel

Seconda particella metallica più grande
Zweitgrösster metallischer Partikel

Particella non metallica più grande (non fibra)
Grösster nichtmetallischer (nichtfaserig) Partikel

Seconda partic.non metall. più grande (non fibra)
Zweitgrösster nichtmetallischer Partikel



Vista del filtro / Filterübersicht

Fibra più grande / Grösste Faser

Please compare picture quality and information level differences between the two example reports. Thanks.
~JG