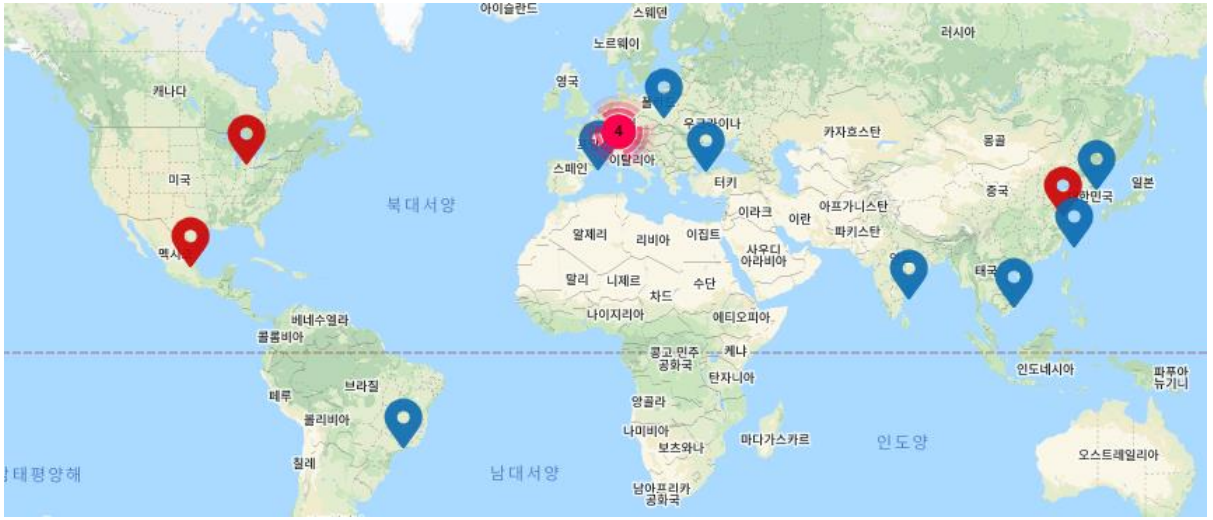
Technical Cleanliness System 제안

Glaser-Group

: 1976년 독일 독일 남부 호르브 지역에서 설립되어 약 40년 이상 VDA 관련 부품 청정도 시험 및 VDA에 대한 기술을 전문적으로 제공하는 업체

: 전 세계 약 20여 개 국에서 전문 엔지니어들을 통해 기술을 지원하는 Global Reference 회사

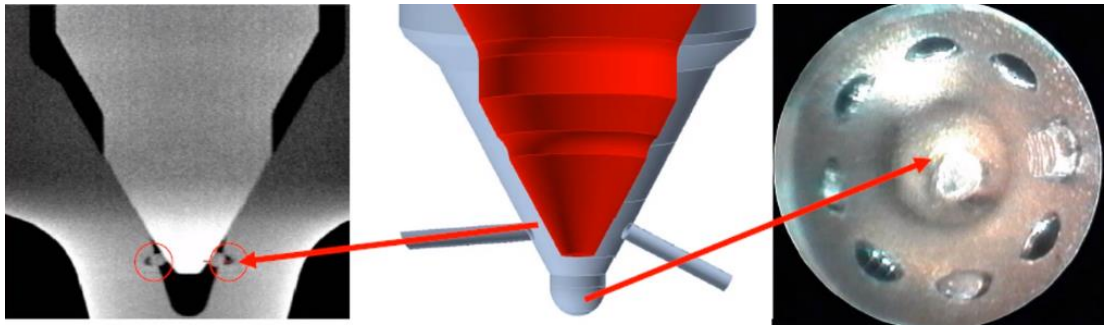


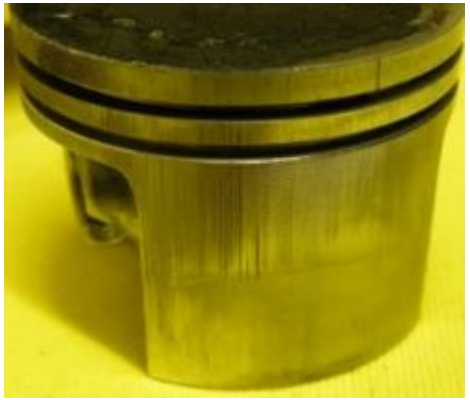
청정도 (Technical Cleanliness) 시험이란?

: 부품의 이물질로 인한 품질문제를 예방하기 위해 진행하는 테스트

VDA 19 규격에 의거하여 자동차 부품에 대한 이물을 포집 및 분석하는 시험

Metallic / Non-Metallic / Fiber 총 3가지로 이물을 구분하여 분석한 후, 이를 히스토그램화하여 분석





청정도 (Technical Cleanliness) 시험 방법

: 오염도 검사 방법

1) 중량계수 분석 : 제품 또는 부품 세정 전과 후의 필터 무게를 측정하여 Particle의 무게를 측정하는 방법

2) 입자계수 분석 : 제품 또는 부품을 세정하여 필터에 포집된 Particle를 현미경을 통해 분석하는 방법

3) 성분 분석 : SEM-EDX, XRF 등을 이용하여 포집된 Particle의 성분을 분석하는 방법

< 중량계수 >

< 입자계수 >

< 성분분석 >

청정도 (Technical Cleanliness) 시험 소개 동영상

이물 포집 시스템 – ACM 17

* Medium: Hydrocarbons Haku 1025-921 or De-Solv- IT 1000; Demineralised (VE) water on demand

→ **ACM 17 Specification**

- Working place with 1 working area
- Machine control unit SIEMENS SPS S7-1200
- Feed pump diaphragm pump (230V/50Hz)
- Vaccum pump diaphragm pump (230V/50Hz)
- System filter : 0.2um; length : 50inches
- Return line filter : 5.0um; length : 5inches
- 3 bar system pressure
- Feed volume : 0.250 l/min ~ 2.0 l/min
- Rinse, spray (10~2,000 ml/min), flood up to 5L, ultrasound 20~200W max. 10min
  (Spray nozzle (pen) 2.5mm, 250~2,000 ml/min flow rate)
- Tank volume : 12.8 L (Useful volume : 11L)
- HEPA particle filter in the fan cabin for active protection (efficiency 99.995% for particles larger then 0.3um)
- 15 ~ 25 degree permissible ambient temperature
- 32 different test programs, each with 30 flushing steps
- Operation via 12” BASIC touch panel
- Basin with working volume of approx. 7 L (300mm to 500mm)
- Introductory opening for components: approx. 550X500mm
- Carrier for ultrasound application for components up to 3kg
- Extraction methods: spraying, flushing, ultrasound
- 47mm analysis diaphragm
- 1,150 X 770 X 1,850mm system dimension (1,000X1,900mm opening approx.) / 200kg

이물 포집 시스템 – ACM18

* Medium: Hydrocarbons Haku 1025-921 or De-Solv- IT 1000; Demineralised (VE) water on demand

→ **ACM 18 Specification**

- Working place with 1 working area
- Machine control unit SIEMENS SPS S7-1200
- Feed pump diaphragm pump (230V/50Hz)
- Vaccum pump diaphragm pump (230V/50Hz)
- System filter : 0.2um; length : 50inches
- Return line filter : 5.0um; length : 5inches
- 3 bar system pressure
- Feed volume : 0.250 l/min ~ 2.0 l/min
- Rinse, spray (250~2,000 ml/min), flood up to 5L, ultrasound 20~200W max. 10min (Spray nozzle (pen) 2.5mm, 250~2,000 ml/min flow rate)
- Tank volume : 12.8 L (Useful volume : 11L)
- HEPA particle filter in the fan cabin for active protection (efficiency 99.995% for particles larger then 0.3um)
- Automatic internal flushing
- Operation via 12” BASIC touch panel
- Basin with working volume of approx. 7 L (300mm to 600mm)
- Introductory opening for components: approx. 550X500mm
- Carrier for ultrasound application for components up to 15kg
- Extraction methods: spraying, flushing, ultrasound
- 47mm analysis diaphragm
- 1,350 X 900 X 2,000mm system dimension / 280kg

이물 포집 시스템 – RiuS Single

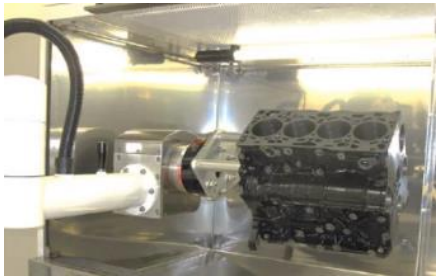
* Medium: Hydrocarbons Haku 1025-921 or De-Solv- IT 1000; Demineralised (VE) water on demand

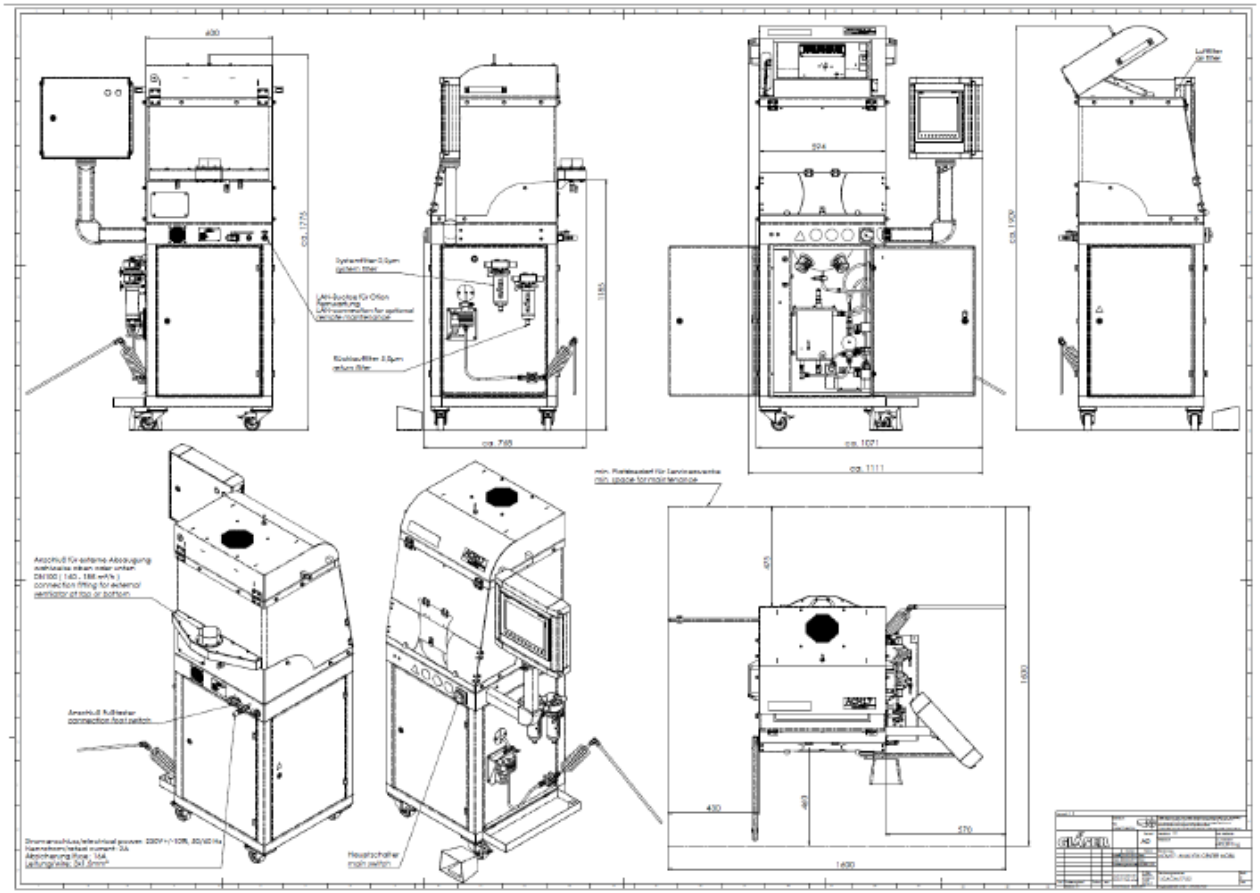
→ **Rius Single Specification**

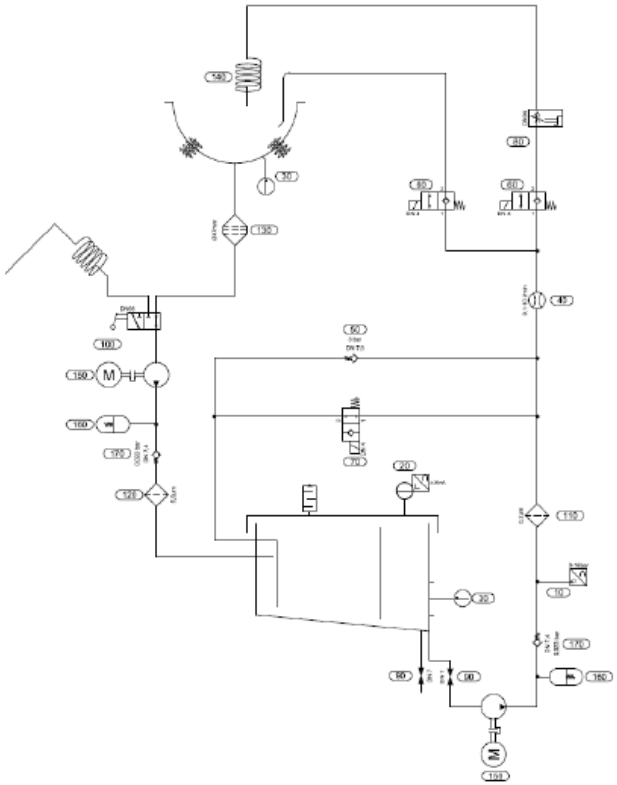
- Analysis room lined with polished stainless steel with parts holder in the analysis room for components weighing up to 100 kg
- Medium circuit / one-tank-system (EX-Zone 2 in analytic chamber)
- Flushing fluid supply (technical specification)
  Minimum volume flow rate : 250 ml/min
  Maximum volume flow rate via pen approx. 3.0 l/min, continuously variable
- Tank capacity of 12.7 L (possible to increase 35 L_optional)
- System filter : 0.2 um
- Return filter : 5.0 um
- Spray nozzle (pen) 2.5mm (changeable, inclusive scope of supply)
- User-friendly machine filling and emptying via 3-way valve
- Drip-drop protection function
- Automatic internal flushing
- Width appr. 1200 X height appr. 800 X depth appr. 800 mm
  Opening for parts appr. 100 mm less/each
- The user-friendly, lifting and tilting membrane holder includes three individual cascade rings with tweezer leads for safe and simple membrane fitting and removal of Ø 47 mm membrane filters
- HEPA particle filter (efficiency 99.995% for particles larger than 0.3um)
- 1,650 X 2,150 X 1,130 mm (W x H x D)_height adjustment 2,100 ~ 2,400mm / 470 kg
- Main power 230V AC 10% 50Hz / Rated power 600W / Rated current 2.5A / 16A fuse (Max) / 3X15mm2 supply cable / Control voltage 24V DC

대형 부품 이물 포집

* Medium: Hydrocarbons Haku 1025-921 or De-Solv- IT 1000; Demineralised (VE) water on demand







필터 건조 시스템

→ **Easy Dry Ⅱ Specification**

- Switchgear cabinet integrated in housing
- Vacuum pump : Diaphragm pump (12V DC)
- Diaphragm baseplate with heating and cooling function
- Removable lid with heating element
- Possible to use six modes with various color with front pane
- 15 ~ 25 degree permissible ambient temperature
- Below 70 dB noise emission
- Drying of analysis membranes for further evaluations
- Medium: A III cold cleaner, other media only on consultation
- Drying of analysis membranes up to Ø 47 mm
  (temperature-resistant to > 129°C/264.2°F or at least + 129°C/264.2°F).
- Catchment vessel for extracted liquid
- 48 X 46 X 48mm system dimension / 30kg

LED for easy differentiation of six modes with various colors and additional beep e.g. "drying process completed".

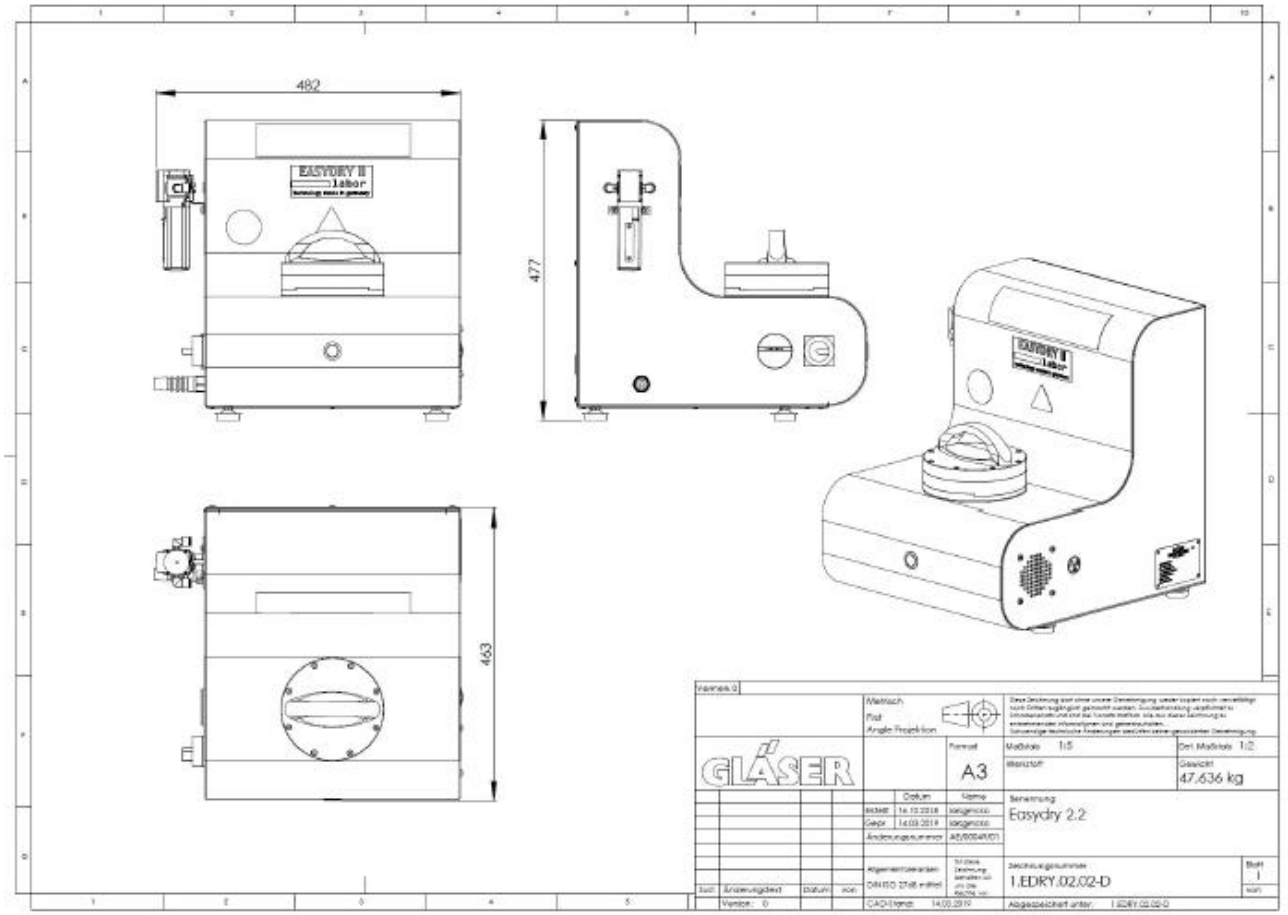
REDUCTION of cross-contamination during handling the membranes.

ERGONOMIC WORK TOP POSITION with shelves for an easy and safe membrane handling.

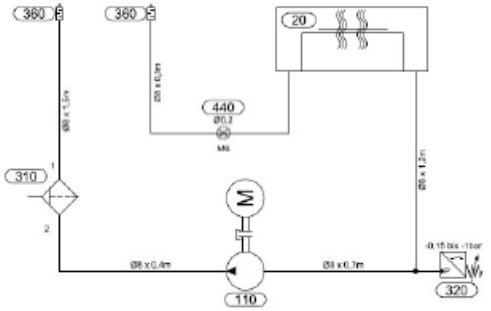
INCREASE OF PROCESS SAFETY during membrane drying by reduction of number of process steps.

EASY MAINTENANCE and reduction of excessive moisture by a slightly emptiable collecting container.

EFFICIENT LABORATORY WORK by double saving of time each at the requested preparation and post-processing of membranes. Drying within 7-9 minutes.



Pos.	Qty.	ArticleCode	Description
20	1	1.9831.03.21	Heating plate
110	1	5.9840.05.16	Diaphragm pump
310	1	5.9831.04.67	Filter
320	1	5.9840.06.89	Pressure switch
360	2	5.9831.05.08	Silencer
440	1	5.9840.06.78	Orifice



GLÄSER

Maßstab 1:5 | Format A3 | Gewicht 47.636 kg

Bezeichnung: Easydry 2.2

Zeichnungsnummer: 1.EDRY.02.02-D

Allgemeintoleranzen: DIN ISO 2768 mittel

CAD-Name: 14.03.2019

Abgespeichert unter: 1.EDRY.02.02-D

Diese Zeichnung darf ohne unsere Zustimmung weder kopiert noch vervielfältigt noch Dritten zugänglich gemacht werden. Alle aus diesem Dokument zu entnehmenden Informationen sind geheim zu halten.

Customer :

Glaser GmbH, Robert-Bosch-Str. 32, 72160 Horb am Neckar, +49 7451 93920 0, www.glaser-gmbh.de

Drawn by : SR | Date : 01.06.2017

Checked by : SR | Date : 18.06.2018

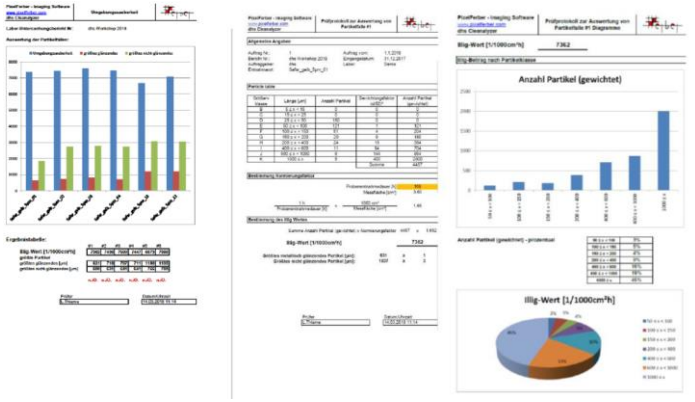
Weight : | Material :

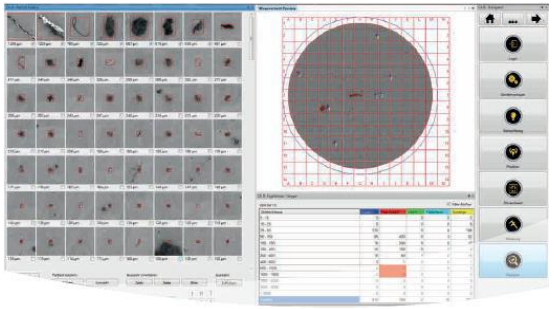
Paper Size : ISO A4	Page : 1	Status	Project number	Drawing Number	Revision
Scale :	Pages : 1		EASYDRY	1.EDRY.02.01	2

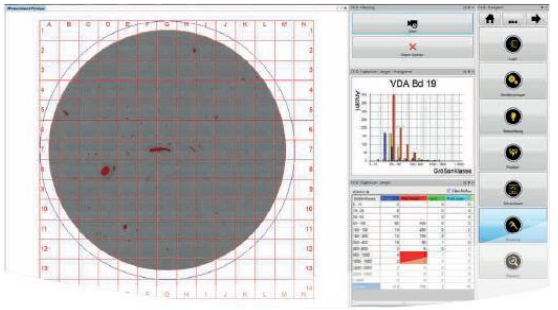
입자 계수 분석

→ **DHS Cleanalyzer Specification**

- Leica DM4M Main optical microscope body
- Bright field reflector fixed
- Trinocular tube with 0.7X C-mount
- 10X/22 Br.M eyepiece
- Stage carrier with condenser holder
- Particle Standard target 70X70X2mm
- 2,5X, 5X, 10X, 20X Obj. Lens (BF)
- Z-axis auto drive with OASIS board (with smart move)
- X,Y-axis auto drive with Mahzhauser
- USB 3.0 type CMOS camera 지원
- ISO 16232 / VDA 19에 의거한 Particle 자동 측정 및 분류
- 전체 이미지 / 개별 이미지 확인
- 표준화된 Fiber 계산
- 커버리지 밀도 백분율 계산
- 잔류 Particle에 대한 추가 색상 특성 결정
- 다중 필터 분석 지원 (완전 자동화)
- 다양한 필터 모양 대응 (원 / 직사각형)
- Auto report export 지원







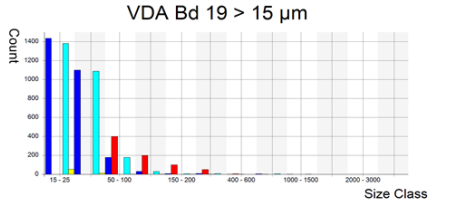
입자 계수 분석

→ 부품의 이물을 membrane에 포집 및 건조하여 광학계를 통해 VDA 규격에 의거하여 이물을 분석

→ Metallic / Non-Metallic / Fiber를 구분하여 각 Class 별로 구분하여 분석

PixelFerber - Imaging Software
www.pixelferber.com
Residual dirt analysis

Histogram Length



Histogram Table Length

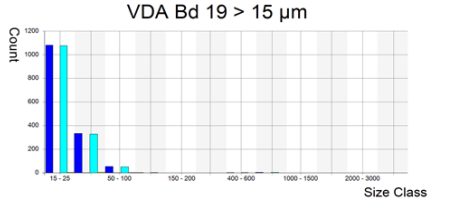
Size Class	All	Max	Fibre	Metallic	Others	
15 - 25	1435		0	1381	54	
25 - 50	1100		0	1088	12	
50 - 100	179	400	0	178	1	
100 - 150	31	200	0	30	1	
150 - 200	7	100	0	6	1	
200 - 400	8	50	1	7	0	
400 - 600	1	5	1	0	0	
600 - 1000	5	1	0	5	0	
1000 - 1500	1	0	0	1	0	
1500 - 2000	0	0	0	0	0	
2000 - 3000	0	0	0	0	0	
> 3000	0	0	0	0	0	
Sum	2767	756	2	2896	69	

Largest particles (by type)

Metallic	1095 µm
Fibre	547 µm

PixelFerber - Imaging Software
www.pixelferber.com
Residual dirt analysis

Histogram Width



Histogram Table Width

Size Class	All	Fibre	Metallic	Others		
15 - 25	1081	0	1077	4		
25 - 50	334	1	328	5		
50 - 100	54	1	51	2		
100 - 150	2	0	2	0		
150 - 200	0	0	0	0		
200 - 400	0	0	0	0		
400 - 600	2	0	2	0		
600 - 1000	4	0	4	0		
1000 - 1500	0	0	0	0		
1500 - 2000	0	0	0	0		
2000 - 3000	0	0	0	0		
> 3000	0	0	0	0		
Sum	1477	2	1464	11		

Widest particles (by type)

Metallic	782.486 µm
Fibre	73.89 µm

Particle size class according VDA 19.1 (2015) Chapter 7.2.2 & Annex A 7.3 & ISO/DIS 16232: 2017 Chapter 8.2.2.1			Corresponding filter pore size selection
Size class	Particle size (µm)	Factor for filter pore size selection	Mesh opening (µm)
B C	5 ≤ x < 15 15 ≤ x < 20	1/5	1
D E	25 ≤ x < 50 50 ≤ x < 100	1/5 1/10	5
F	100 ≤ x < 150	1/10	10
G	150 ≤ x < 200	1/10	15
H	200 ≤ x < 400	1/10	20
I	400 ≤ x < 600	1/10	40
Most common filter used for class I and J			50
J	600 ≤ x < 1.000	1/10	50
K	1.000 ≤ x < 1.500	1/10	100
L M	1.500 ≤ x < 2.000 2.000 ≤ x < 3.000	1/10	150
M	3.000 ≤ x	1/10	300

중량 계수 분석

→ **전자저울 Specification**

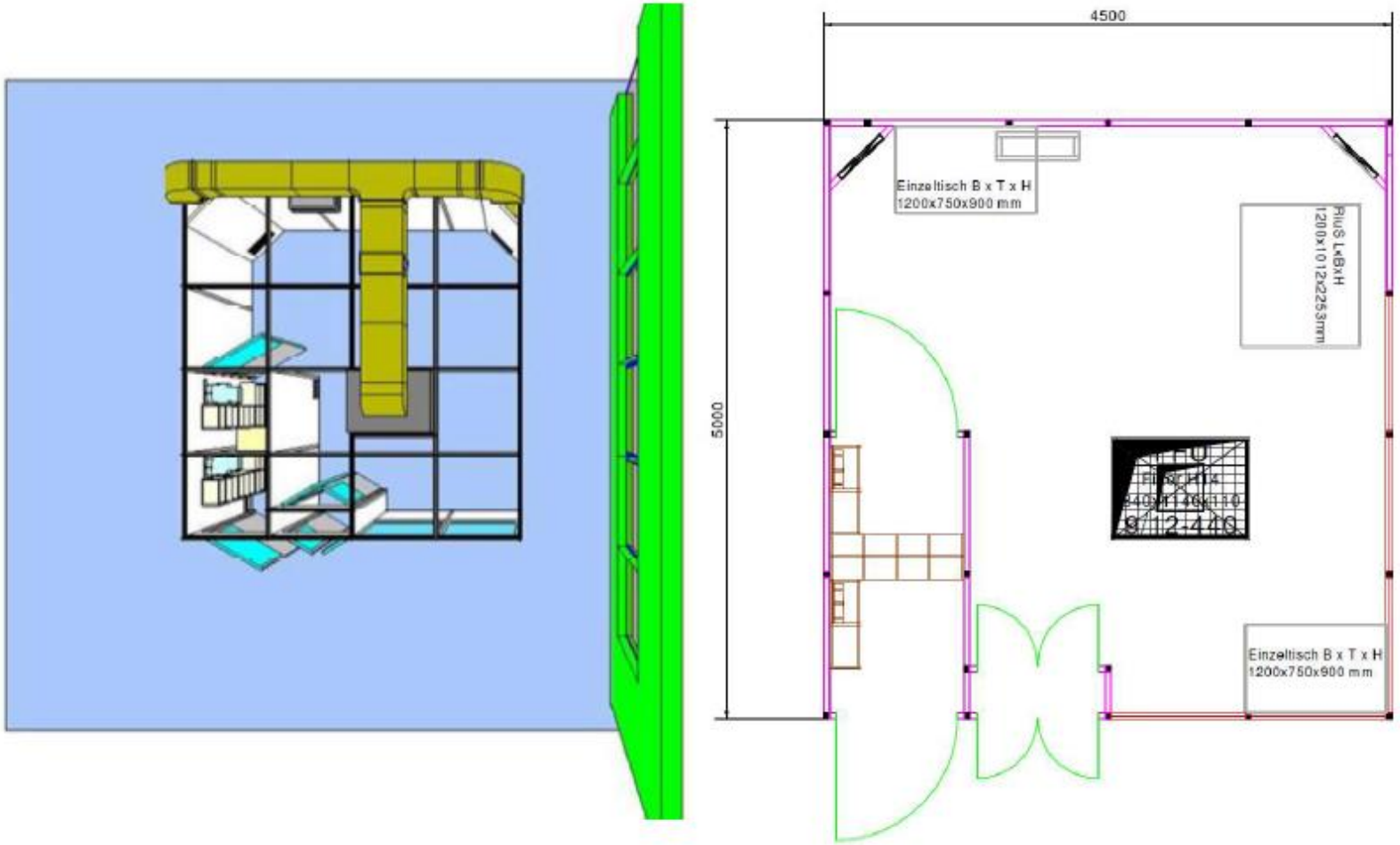
*** Analytical balance 4-digit**

- Readability : 0.1 mg
- Weighing capacity : max. 220 g
- Weighing plate : 90 mm
- Calibration value : 1 mg
- Reproducibility : 0.2 mg

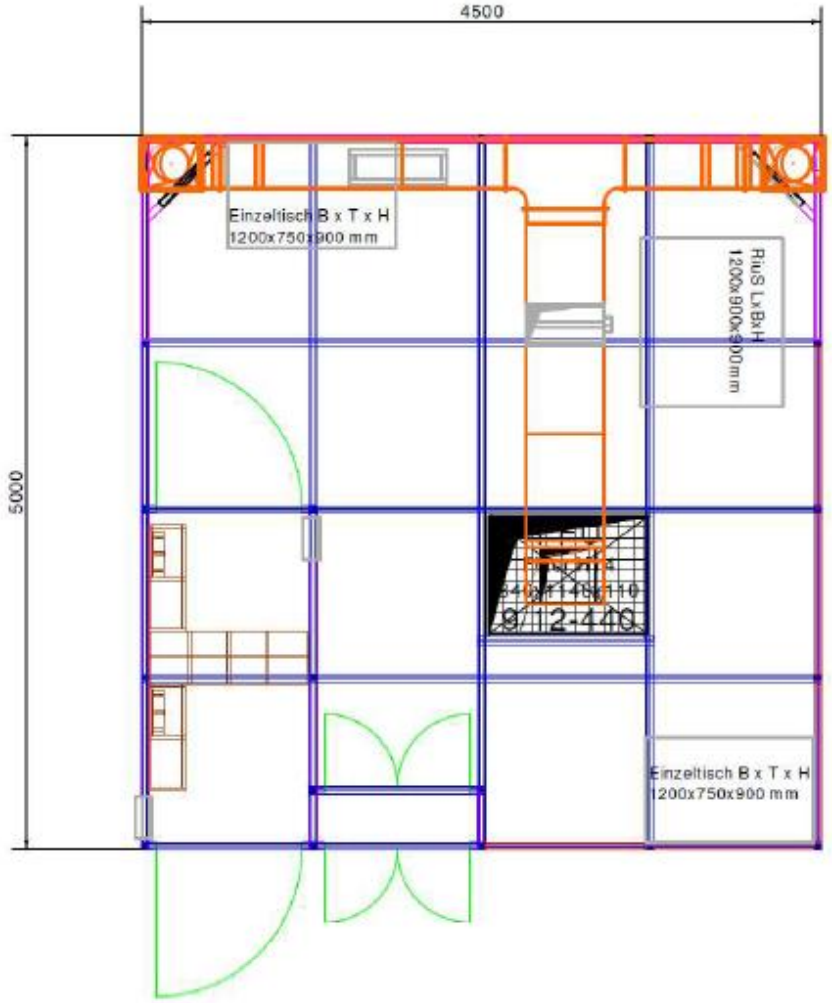
*** Analytical balance 5-digit**

- Weighing capacity : 0 – 82 g / 0 – 220 g
- Readability : 0.01mg / 0.1 mg
- Dimensions weighing pan : 80 mm

청정도 검사실 레이아웃


4500
5000
Einzeltisch B x T x H
1200x750x900 mm
Einzeltisch B x T x H
1200x750x900 mm

청정도 검사실 레이아웃


4500
5000
Einzeltisch B x T x H
1200x750x900 mm
RiuS LxBxH
1200x900x900mm
Einzeltisch B x T x H
1200x750x900 mm

청정도 시험 기타 필요 물품

→ Equipment

- Desiccator
- Cleanroom table
- Cleanroom chair
- Hand dryer
- Permanent adhesive sticky mat
- Storage cupboard
- 기타 Cleanroom에 필요한 용품

청정도 검사실 검토 필요 사항

Clean room:
→ Immobile installed room, which has adequate conditions of design, regulartion of personnel, logistics, maintenance and production processes for the keeping the
Technical Cleanliness of products.

Ground, ceiling and walls in clean areas should be designed and constructed in a way which allows an easy cleaning and treatment of all surfaces.

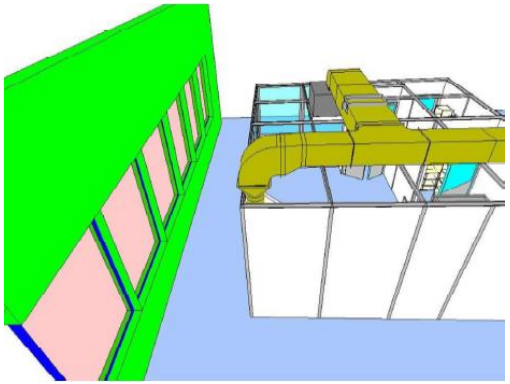
Ground
→Should resist chemical treatment (f. ex. Of oils), mechanical treatment and if necessary ESD-safe. Synthetic sealings or cleanroom grounding suggested

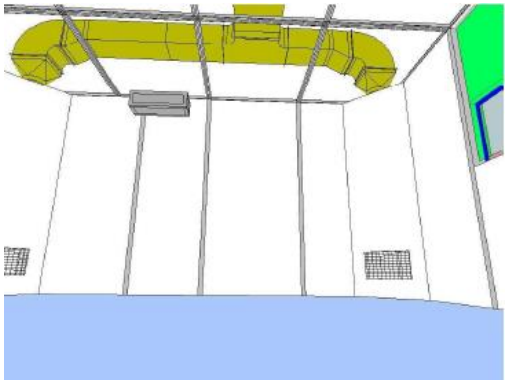
Wall
→Abrasion-proofed materials

Ceiling / inserted ceiling
→Suspended or elevated of abrasion-proofed material

Personnel-/material locks
→Targeted and controlled material input

Air
→ Inlet/cycling with additional fine filtration f. ex. Filter class F7





청정도 검사실 검토 필요 사항









Glaser Reference

Glaser Reference

- Airbus Operations GmbH, Hamburg (D)
- Analytik Aurachtal GmbH, Aurachtal (D)
- Auto Heinen GmbH, Bad Münstereifel (D)
- Baier + Köppel GmbH & Co. Pregnitz (D)
- Biedermann Motech GmbH & Co. KG, Villingen-Schwenningen (D)
- Borer Chemie AG, Zuchwil (CH)
- Bosch Automotive Diesel Systems Co. Ltd., Qindao Branch (CN)
- Bosch Automotive Diesel Systems Co. Ltd., Jiangsu-Wuxi (CN)
- Bosch Diesel S.R.O., Jihlava (CZ)
- Bucher Hydraulics GmbH, Klettgau (D)
- Claas Selbstfahrende Erntemaschinen GmbH, Harsewinkel (D)
- Cooper Standard Deutschland GmbH, Grünberg (D)
- Cooper Standard Deutschland GmbH, Schelklingen (D)
- Deutz AG, Köln (D)
- Dura Automotive Systems Einbeck GmbH, Einbeck (D)
- Eaton Germany GmbH Hydraulics Group, Baden Baden (D)
- Elkamet s.r.o., Nyrany (CZ)
- Elkamat Kunststofftechnik GmbH, Biedenkopf (D)
- Gero GmbH, Bubsheim (D)
- GF Automotive Gerog Fischer GmbH, Werdohl (D)
- Hoerbiger Antriebstechnik GmbH, Schongau (D)
- Hoerbiger SynchronTechnik GmbH & Co. KG, Oberstenfeld (D)
- KGM Kugelfischer GmbH & Co. KG, Fulda (D)
- Knorr Bremse Systeme f. Schienenfahrzeuge GmbH, München (D)
- Knorr Bremse Systeme für die Nutzfahrzeuge GmbH, Aldersbach (D)
- „Konfektion E“ Elektronik GmbH, Kreßberg-Marktlustenau (D)
- LISI Automotive Knipping Espana SA, Madrid (E)
- MAGURA Gustav Magenwirth GmbH & Co. KG, Bad Urach (D)
- Maschinenfabrik Alfing Kessler, Aalen (D)
- MEKU Mechatronische Systeme GmbH, Eiching bei Landshut (D)
- Motorenfabrik Hatz GmbH & Co. KG, Ruhstorf a.d. Rott (D)
- MSR Technologies GmbH, Laupheim (D)
- Mubeau Muhr und Bender KG, Weitefeld (D)
- MWS Hightec GmbH, Ternberg (A)
- Neumayer Tekfor GmbH, Hausach (D)
- Parker Hannifin GmbH, Bielefeld (D)
- Robert Bosch Fahrzeugelektrik Eisenach GmbH, Eisenach (D)
- Robert Bosch GmbH, Bamberg (D)
- Robert Bosch GmbH, Nürnberg (D)
- Robert Bosch GmbH, Stuttgart-Feuerbach (D)
- Robert Bosch Fahrzeugelektrik Eisenach GmbH (D)
- Robert Bosch LLC, Charleston (US)
- Robert Bosch GmbH Werk West, Homburg (D)
- Reich GmbH, Mellrichstadt (D)
- SGTechnologies Limited, Essex (GB)
- Standard Metallwerke GmbH, Werl (D)
- Tedrive Steering Systems GmbH, Wülfrath (D)
- Tremec Drive Line Mechantronics B.V.B.A, Loppem (B)
- Veldener Präsisionstechnik GmbH, Vilsbiburg (D)
- Wabco Fahrzeugsysteme GmbH, Hannover (D)
- Robert Bosch Korea Ltd., Daejeon
- Fischer Automatendrehteile GmbH & Co. KG, Göttingen (D)
- PWO Czech Republic a.s., Valasske Mezirici (CZ)
- Progress-Werk Oberkirch AG, Oberkirch (D)
- Preh GmbH, Bad Neustadt (D)
- Paul Bippus GmbH, Oberndorf (D)
- Euscher GmbH & Co., Bielefeld (D)
- Faurecia Emmisions Control Technologies, Finnentrop (D)
- And more

THANK YOU