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Haze Meter Introduction

■ Hangzhou CHNSpec Technology Co., Ltd

CHN Spec Haze Meter TH and CS Series



TH-09/TH-100

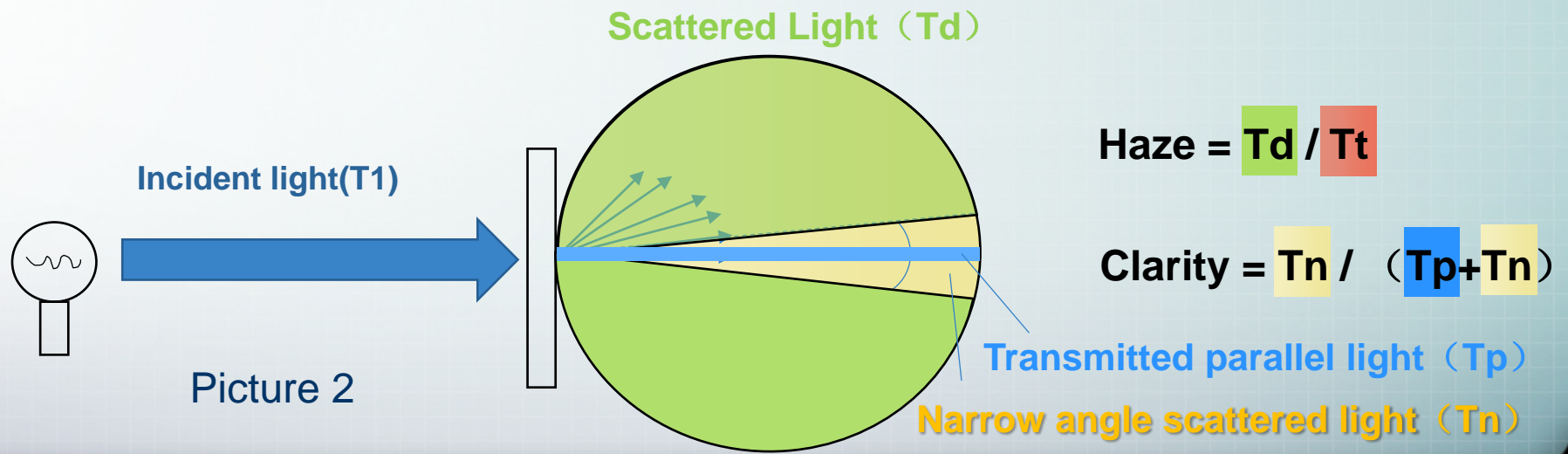
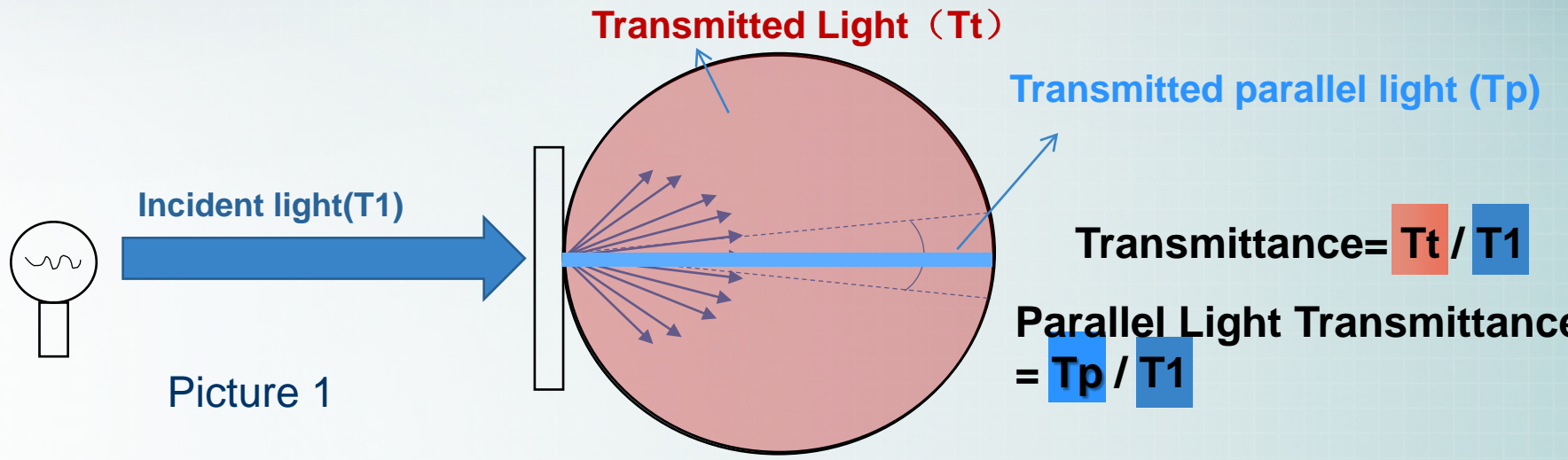


TH-110

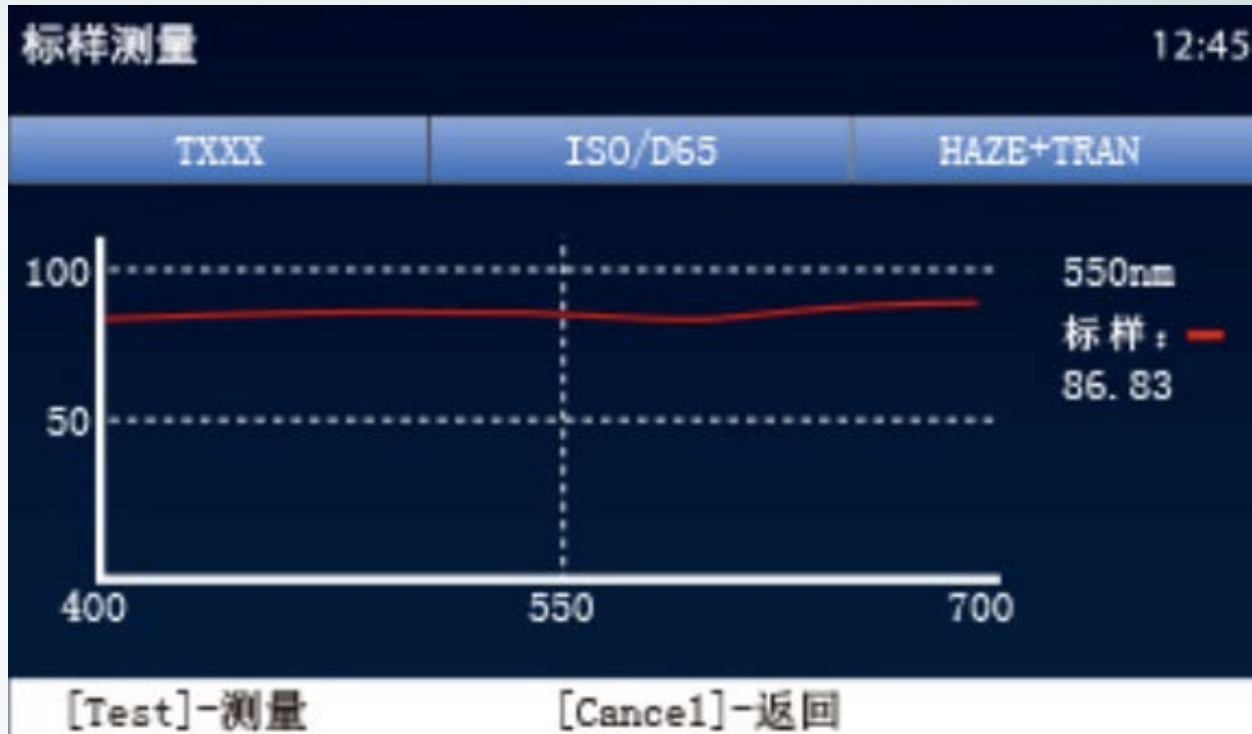


CS-700/CS-720

What is haze, transmittance and clarity?



Transmittance



CS-700/CS-720 can get the transmittance curve and value at 10nm interval under wavelength 400-700nm. Its wavelength range can be custom made to extend into 360-780nm.

Visual Effect of Same Transmittance and Different Haze



Same Transmittance

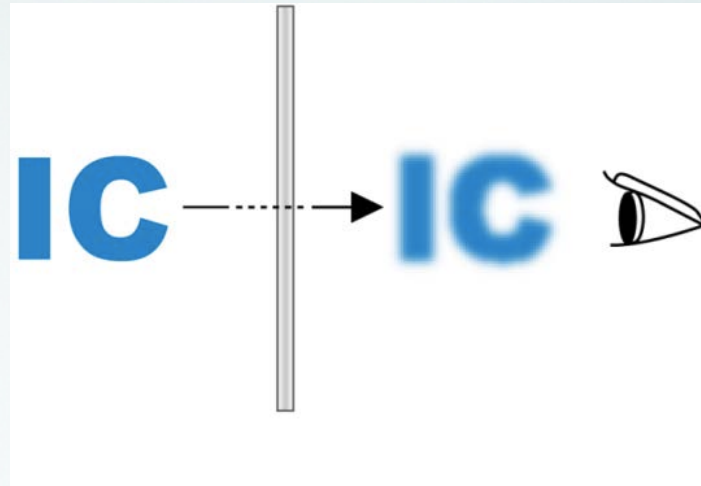
low haze material

VS

high haze material

Visual Effect of Different Clarity

Transmission Clarity Image



Bar codes are covered by the plastic films with different clarity.



87.8%



58.6%



18.6%

Color Parameters

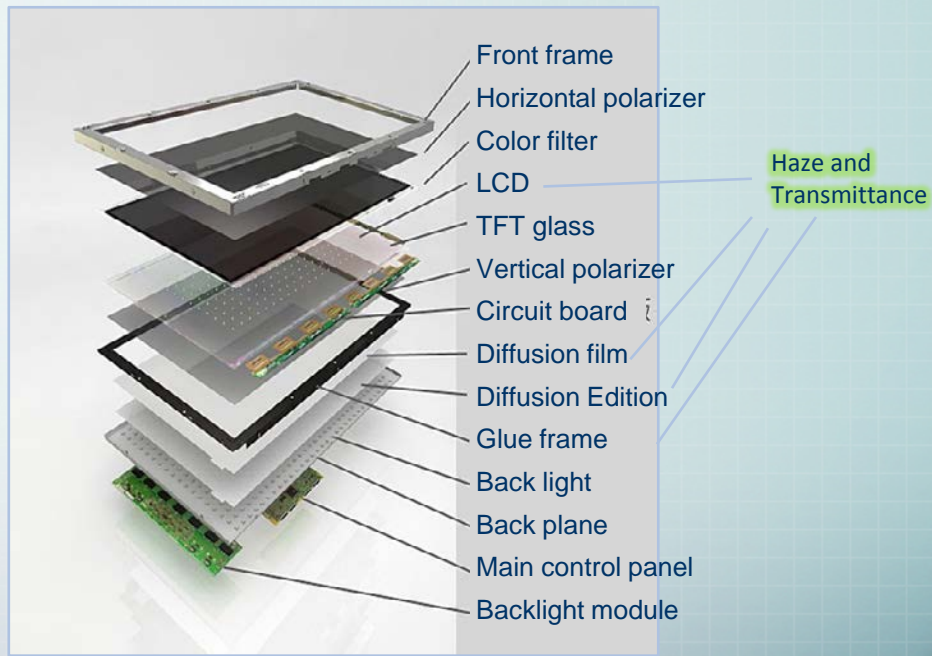
Color Parameters of CS-700 / CS-720:

CIE-Lab, LCh, CIE-Luv, XYZ, Yxy, HunterLab, MunsellMI, CMYK,
WI (ASTME313-00, ASTME313-73, CIE/ISO, Hunter, TaubeBergerStensby),
YI (ASTMD1925, ASTME313-00, ASTME313-73), Tint (ASTME313-00),
Metamerism Index Milm, APHA, Pt-Co, Gardner, color difference
(ΔE^*ab , ΔE^*CH , ΔE^*uv , $\Delta E^*cmc(2:1)$, $\Delta E^*cmc(1:1)$, ΔE^*94 , ΔE^*00)

Haze Meter Application-Screen



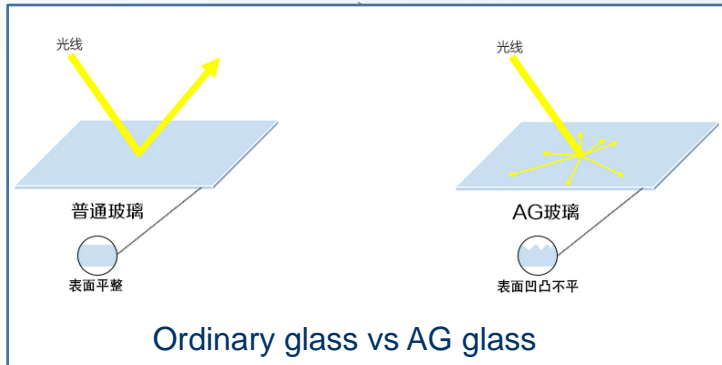
- Flim
 - Haze
 - Transmittance
- Cover plate
 - Color (use spectrophotometer)
 - Reflectivity (use spectrophotometer)
- Touch module
 - Haze and Transmittance
- LCD module
- Lighting module



Haze Meter Application-Glass

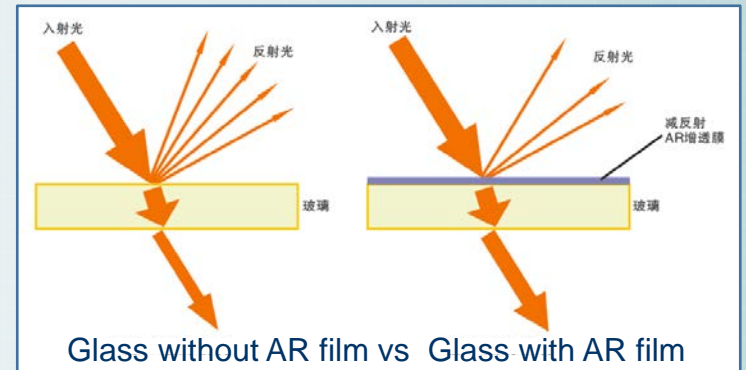
AG Glass

(Haze and Transmittance)



AR Glass

(Transmittance and Reflectivity)



Outdoor Display



TV Screen



Photo Frame



Phone Screen



Watch Glass



Display Window Glass



Haze Meter Application-Functional Film

Soft film



Agricultural Film



Cling /Warping Film



Peep-proof protection film



Anti glare film

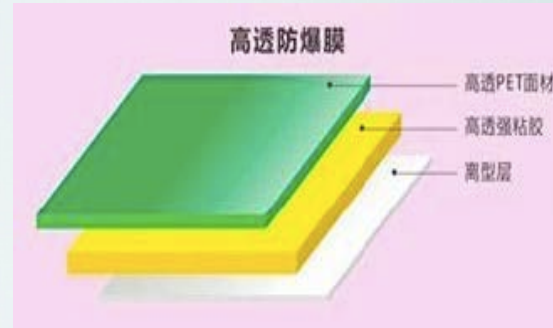


Anti ultraviolet film



Window membrane

Hard film



Optical film



Steel film



According to previous data, haze meter is the most commonly used in film industry.

TH Series Haze Meter Advantages



- √ Simple Operation, one key for test, fast measurement speed
- √ No need warm up, as soon as it starts, it can be used
- √ High accuracy, haze repeatability 0.05, transmittance repeatability 0.1
- √ Upward design test aperture for easier sample measurement
- √ It supports both horizontal and vertical measurement to measure different kinds of samples.
- √ Small size and light weight only 6kgs
- √ TH-110 adopts 7 inches touch screen with Android system

CS-700/720 Haze Meter Advantages




Haze Meter CS-700/720

- Parameter : haze, transmittance, spectral transmittance, transmission color, clarity
- Conform to ASTM and ISO Standard
- Dual optical path design for better repeatability, haze repeatability 0.05 and transmittance repeatability 0.1
- 7-inch touch screen with Android operating system
- Open sample area, no limit on sample size
- No need warm up, as soon as it is starts, it can be used
- Different kinds of fixtures for samples measurement
- Free haze QC software for test, generate and print test report
- Flexible customization of instrument and software
- Warranty 1 year

Haze Meter Traceable Calibration Certification from National Lab

South China National Metrology Institute





校准证书

CALIBRATION CERTIFICATE

证书编号: HGG201911063 第 1 页, 共 4 页
 Certificate No. Page of

委托方
 Client

委托方地址
 Add. of Client

计量器具名称: 雾度计
 Description

型号规格: TB-100
 Model/Type

制造商: 彩谱
 Manufacturer

出厂编号: F1111910101 设备编号: AE111
 Serial No. Equipment No.

接收日期: 2018 年 11 月 15 日
 Date of Receipt Y M D

结果: 见校准结果
 Results Shown in the results of calibration

校准日期: 2018 年 11 月 15 日
 Date of Calibration Y M D

批准人: [Signature] 尹俊斌
 Approved Signatory

核 验: [Signature] 朱启乐
 Checked by

校 准: [Signature] 郑瑜
 Calibrated by

本中心地址: 中国广州市园中路松苑B座30号 邮政编码: 510405
 电话: (0620)86594172 传真: (0620)86590743 投诉电话: (0620)26296663 E-mail: scnm@scnm.com.cn
 Add: No.30, Songhai East Street, Guangyuan Middle Road, Guangzhou, Guangdong, China
 Post Code: 510405 Tel: (8620)86594172 Fax: (8620)86590743 Complaint Tel: (8620)26296663
 证书真伪查询: www.scnm.com.cn www.tnmp.com Certificate Authority Identity: www.cma.com.cn www.cma.com.cn

East China National Metrology Institute



校准证书编号: 2019F49-10-2232466001
 Calibration certificate series No. 

上海市计量测试技术研究院

SHANGHAI INSTITUTE OF MEASUREMENT AND TESTING TECHNOLOGY

华东国家计量测试中心

NATIONAL CENTER OF MEASUREMENT AND TESTING FOR EAST CHINA

校准证书

Calibration Certificate

委托者: TAIWAN GREEN POINT ENTERPRISES CO., LTD
 Customer

联络信息: /
 Contact information

器具名称: 雾度计
 Name of instrument

制造厂: 杭州彩谱科技有限公司
 Manufacturer

型号/规格: /
 Model/Specification

器具编号: 见附表
 No. of instrument

器具准确度: /
 Instrument accuracy

批准人: 李铁成 [Signature]
 Approved by

(机构校准专用章) 核 验 员: 夏俊雯 [Signature]
 Checked by

校 准 员: 高建强 [Signature]
 Calibrated by

发布日期: 2019 年 12 月 13 日
 Issue Date Year Month Day

地址: 上海市张江路1500号(总部) 电话: 021-36839600 传真: 021-50798390 邮编: 201203
 Address No.1500 Zhangjiang Road, Shanghai(Main Office) Tel: Fax: Post Code

客户咨询电话: 800-820-5172 投诉电话: 021-50798262
 Customer Line Complaints Line

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 Part used without the approval of this center is invalid.

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 Page of total pages

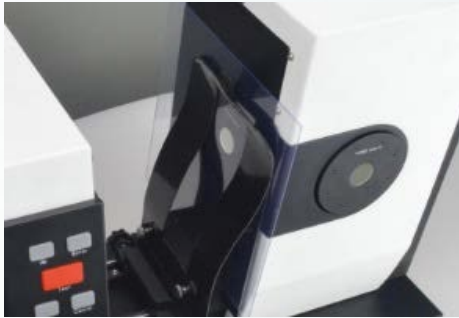
CHNSpec Haze Meter Advanced Technology



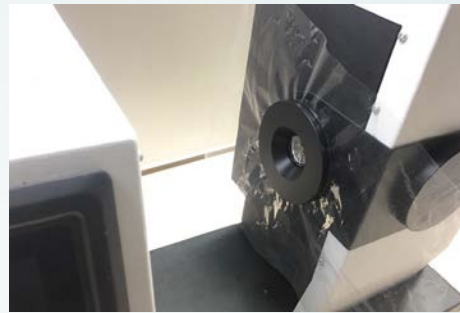
26 kinds of National Patents

CHNSpec Haze Meter Fixtures

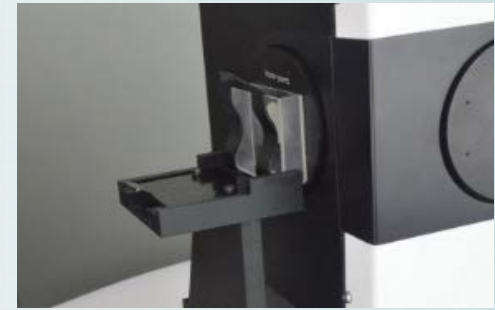
Sample Fixtures



Fixture for Sheet
Materials



Soft Film Fixture



Liquid Fixture

CHNSpec Haze Meter Comparison

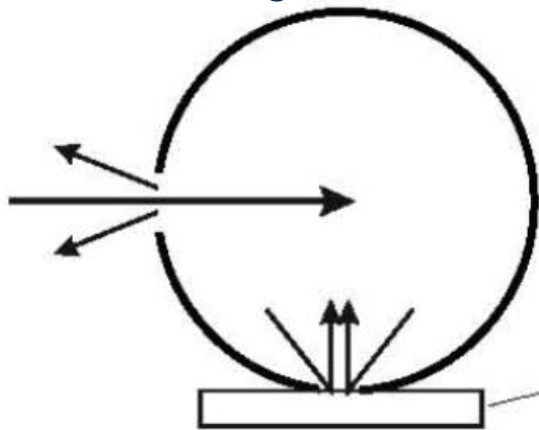
Model	Standard		Repeatability	Screen	Memory	Parameter				
	ASTM	ISO				Haze	Transmittance	Spectral Transmittance	Color	Clarity
TH-09	✓		0.1	5-inch TFT Screen	10,000 value	✓	✓			
TH-100	✓	✓	0.08	5-inch TFT Screen	20,000 value	✓	✓			
TH-110	✓	✓	0.05	7-inch touch screen	Mass storage	✓	✓			
CS-700	✓	✓	0.05	7-inch touch screen	Mass storage	✓	✓	✓	✓	
CS-720	✓	✓	0.05	7-inch touch screen	Mass storage	✓	✓	✓	✓	✓

CHNSpec Haze Meter Standards

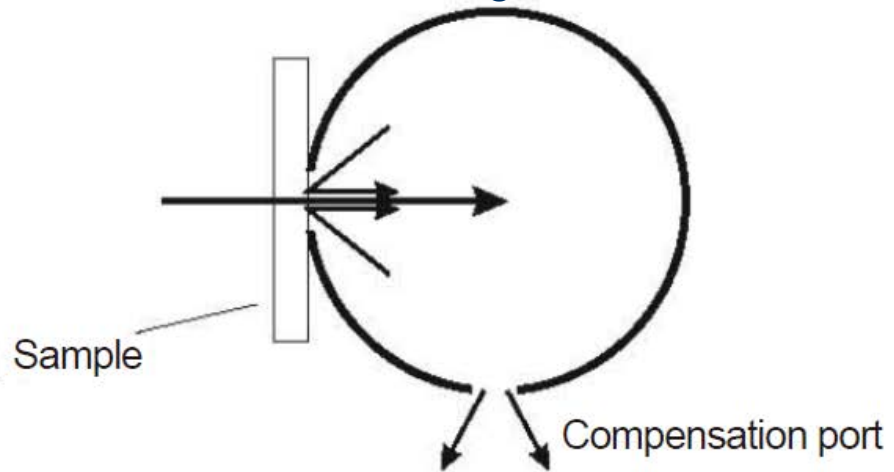
✓ TH-09 standard : ASTM

✓ TH-100/110 and CS-700/720 standards : ASTM and ISO







Incident light measurement



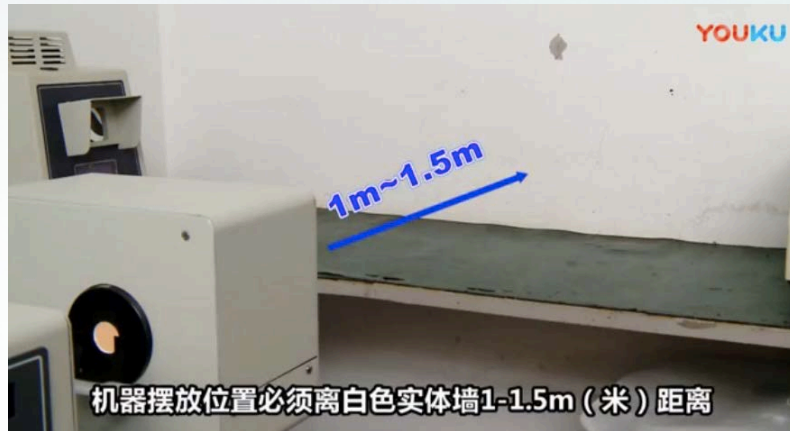
Transmitted light measurement



Competition—Standards supported by each instrument

Picture	Model	ASTM Standard	ISO Standard
	CHNSpec TH-09	✓	
	CHNSpec TH-100	✓	✓
	CHNSpec TH-110	✓	✓
	CHNSpec CS-700	✓	✓
	CHNSpec CS-720	✓	✓
	BYK4775	✓	✓
	NIPPON DENSHOKU NDH7000	✓	✓
	Suga HZ-V3	✓	✓

Competition-Chinese Brand-Model WGT-S

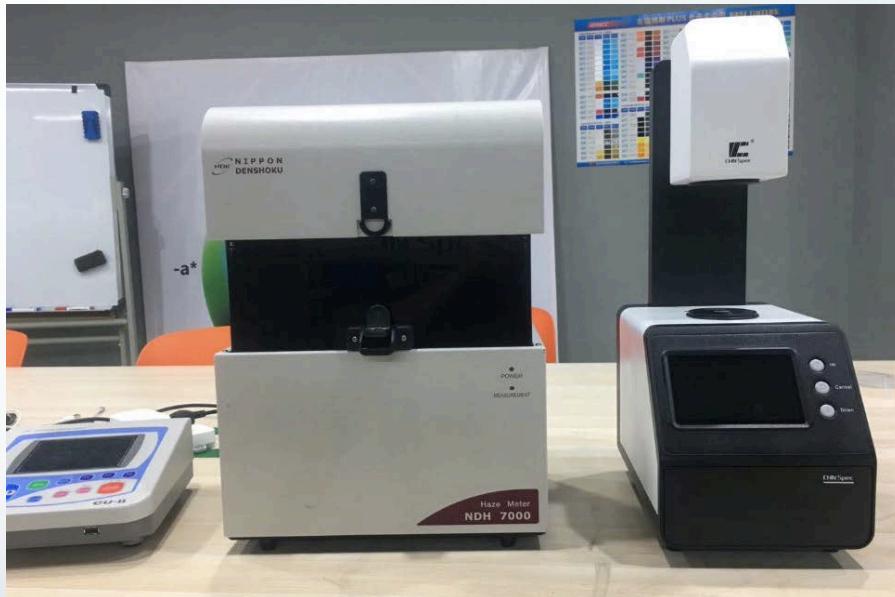


- × Slow measurement speed
- × inconvenient operation
- × Need to preheat for 15-30 minutes
- × there is noise during the test
- × Transmittance Repeatability 0.5
- × User experience is not good, and the light trap exit needs to be free of 1.5 meters
- × Instrument is too heavy 21kgs



Competition-NDH7000 User Experience

Nippon Denshoku NDH7000

- ✘ Closed sample compartment, unable to measure large size samples
- ✘ The instrument is without screen
- ✘ The sample chamber shell is made of black acrylic material, which is fragile



Competition-Comparison of Different Models

Model	Lamp	Pre-heat	Test time	Sample Bin	Touch Screen	Memory	Support vertical and horizontal test	Liquid Test
BYK4775	LED	No	2s	Open	Yes	5000	Yes	
Suga HZ-V3	Tungsten Halogen	==	2.5s	Closed	Yes	500	No	==
Nippon Denshoku NDH7000	LED	No	2s	Closed	No	1000	No	==
CHN Spec CS-700/720	Tungsten Halogen	No	2s	Open	Yes	Mass Storage	Yes	

Competition-CS-700 VS NDH 7000

CHN Spec Haze Meter CS-700



VS

Nippon Denshoku NDH7000



Competition-CS-700 VS HunterLab Vista



VS



Model	Name	Geometry	Standard	Sample Bin	Test Parameter
CS-700	Color and Maze Meter	0/d	ASTM,ISO	Open	haze, transmittance, color
Vista	Spectrophotometer	d/0	ASTM	Closed	haze, transmittance, color

Parameter-Haze Meter CHN Spec VS Ever Fine-1



Model	CHNSpec TH-100	CHNSpec CS-700	CHNSpec CS-720	Ever Fine HAM-200
Lamp	LED	Tungsten Halogen	Tungsten Halogen	Tungsten Halogen
Light Source	CIE-A,CIE-C,CIE-D65	CIE-A,CIE-C,CIE-D65	CIE-A,CIE-C,CIE-D65	CIE-D65
Test Time	1.5s	2s	2s	==
Standard	ASTM D1003/D1044, ISO13468/ISO14782, JIS K 7105, JIS K 7361, JIS K 7136, GB/T 2410-08	ASTM D1003/D1044, ISO13468/ISO14782, JIS K 7105, JIS K 7361, JIS K 7136, GB/T 2410-08	ASTM D1003/D1044, ISO13468/ISO14782, JIS K 7105, JIS K 7361, JIS K 7136, GB/T 2410-08	ASTM D1003,GB/T 2410,ISO14782
Parameter	Haze (HAZE), Transmittance (T)	Haze (HAZE), Transmittance (T), Spectral transmittance, CIE Lab, LCh, CIE Luv, XYZ, Yxy, , Hunter Lab Munsell MI, CMYK, Whiteness WI (ASTM E313-00, ASTM E313-73, CIE/ISO, Hunter, Taube Berger Stensby), Yellow Index YI (ASTM D1925, ASTM E313-00, ASTM E313-73), Tint (ASTM E313-00), Heterochromatic index Milm, APHA, Pt-Co (Index of platinum cobalt), Gardner, Color difference ($\Delta E^*ab, \Delta E^*CH, \Delta E^*uv, \Delta E^*cmc(2:1), \Delta E^*cmc(1:1), \Delta E^*94, \Delta E^*00$) (Other Parameter: Parallel light transmittance, diffuse transmittance, spectral haze can be custom made)	Haze (HAZE), Transmittance (T), Spectral transmittance, Clarity (C%),) CIE Lab, LCh, CIE Luv, XYZ, Yxy, , Hunter Lab Munsell MI, CMYK, Whiteness WI (ASTM E313-00, ASTM E313-73, CIE/ISO, Hunter, Taube Berger Stensby), Yellow Index YI (ASTM D1925, ASTM E313-00, ASTM E313-73), Tint (ASTM E313-00), Heterochromatic index Milm, APHA, Pt-Co (Index of platinum cobalt), Gardner, Color difference ($\Delta E^*ab, \Delta E^*CH, \Delta E^*uv, \Delta E^*cmc(2:1), \Delta E^*cmc(1:1), \Delta E^*94, \Delta E^*00$) (Other Parameter: Parallel light transmittance, diffuse transmittance, spectral haze can be custom made)	Haze (HAZE), Transmittance (T)

Parameter-Haze Meter CHN Spec VS Ever Fine-2



Model	CHNSpec TH-100	CHNSpec CS-700	CHNSpec CS-720	Ever Fine HAM-200
Wavelength Range	400-700nm	400-700nm (360-780nm can be custom made)	400-700nm(360-780nm can be custom made)	400-700nm
Geometry	0/d	0/d	0/d	0/d
Test Aperture	Φ21mm	Φ21mm	Φ 25.4mm	
Test Range	Haze 0-100% Transmittance 0-100%	Haze 0-100% Transmittance 0-100%	Haze 0-100% Transmittance 0-100%	0-100%
Haze Display Resolution	0.01%	0.01%	0.01%	0.01%
Transmittance Display Resolution	0.01%	0.01%	0.01%	
Haze Repeatability	Haze<10%, repeatability≤0.08%, Haze≥10, repeatability≤0.1%;	Haze<10%, repeatability≤0.05%, Haze≥10, repeatability≤0.1%;	Haze<10%, repeatability≤0.05%, Haze≥10, repeatability≤0.1%;	0.1
Transmittance Repeatability	0.1%	0.1%	0.1%	0.03%
Sample Size	Thickness ≤145mm	Thickness ≤145mm	Thickness ≤145mm	Thickness ≤150mm
Memory	20000 values	Mass Storage	Mass Storage	
Interface	USB	USB	USB	
Power	220V	220V	220V	
Dimension	310mm×215mm×540mm	598mmX247mmX366mm	598mmX247mmX366mm	

Parameter-Haze Meter CHN Spec VS BYK, NIPPON DENSHOKU-1



Model	CHNSpec TH-100	CHNSpec CS-700	CHNSpec CS-720	NIPPON DENSHOKU NDH7000	BYK 4725
Lamp	LED	Tungsten Halogen	Tungsten Halogen	LED	LED
Light Source	CIE-A,CIE-C,CIE-D65	CIE-A,CIE-C,CIE-D65	CIE-A,CIE-C,CIE-D65	==	CIE-A,CIE-C
Test Time	1.5s	2s	2s	2S	2s
Standard	ASTM D1003/D1044, ISO13468/ISO14782, JIS K 7105, JIS K 7361, JIS K 7136, GB/T 2410-08	ASTM D1003/D1044, ISO13468/ISO14782, JIS K 7105, JIS K 7361, JIS K 7136, GB/T 2410-08	ASTM D1003/D1044, ISO13468/ISO14782, JIS K 7105, JIS K 7361, JIS K 7136, GB/T 2410-08	ASTM D1003-2007, ISO14782, ISO13468, GB/T 2410-2008	ASTM D1003-2007, ISO14782, ISO13468, GB/T 2410-2008
Parameter	Haze (HAZE), Transmittance (T)	Haze (HAZE), Transmittance (T), Spectral transmittance, CIE Lab, LCh, CIE Luv, XYZ, Yxy, , Hunter Lab Munsell MI, CMYK, Whiteness WI (ASTM E313-00, ASTM E313-73, CIE/ISO, Hunter, Taube Berger Stensby), Yellow Index YI (ASTM D1925, ASTM E313-00, ASTM E313-73), Tint (ASTM E313-00), Heterochromatic index Milm, APHA, Pt-Co (Index of platinum cobalt), Gardner, Color difference ($\Delta E^*ab, \Delta E^*CH, \Delta E^*uv, \Delta E^*cmc(2:1), \Delta E^*cmc(1:1), \Delta E^*94, \Delta E^*00$) (Other Parameter: Parallel light transmittance, diffuse transmittance, spectral haze can be custom made)	Haze (HAZE), Transmittance (T), Spectral transmittance, Clarity (C%), , CIE Lab, LCh, CIE Luv, XYZ, Yxy, , Hunter Lab Munsell MI, CMYK, Whiteness WI (ASTM E313-00, ASTM E313-73, CIE/ISO, Hunter, Taube Berger Stensby), Yellow Index YI (ASTM D1925, ASTM E313-00, ASTM E313-73), Tint (ASTM E313-00), Heterochromatic index Milm, APHA, Pt-Co (Index of platinum cobalt), Gardner, Color difference ($\Delta E^*ab, \Delta E^*CH, \Delta E^*uv, \Delta E^*cmc(2:1), \Delta E^*cmc(1:1), \Delta E^*94, \Delta E^*00$) (Other Parameter: Parallel light transmittance, diffuse transmittance, spectral haze can be custom made)	Haze, total transmittance, diffuse transmittance, parallel transmittance and turbidity	Haze (HAZE), Transmittance (T)

Parameter-Haze Meter CHN Spec VS BYK, NIPPON DENSHOKU-2



Model	CHNSpec TH-100	CHNSpec CS-700	CHNSpec CS-720	NIPPON DENSHOKU NDH7000	BYK 4725
Wavelength Range	400-700nm	400-700nm (360-780nm can be custom made)	400-700nm(360-780nm can be custom made)	400-700nm	400-700nm
Geometry	0/d	0/d	0/d	0/d	0/d
Test Aperture	Φ21mm	Φ21mm	Φ 25.4mm	==	Φ21mm
Test Range	Haze 0-100% Transmittance 0-100%	Haze 0-100% Transmittance 0-100%	Haze 0-100% Transmittance 0-100%	Haze 0-100% Transmittance 0-100%	Haze 0-100% Transmittance 0-100%
Haze Display Resolution	0.01%	0.01%	0.01%	0.01%	0.01
Transmittance Display Resolution	0.01%	0.01%	0.01%	0.01%	0.1
Haze Repeatability	Haze<10%, repeatability≤0.08%, Haze≥10, repeatability≤0.1%;	Haze<10%, repeatability≤0.05%, Haze≥10, repeatability≤0.1%;	Haze<10%, repeatability≤0.05%, Haze≥10, repeatability≤0.1%;	0.03	0.1%
Transmittance Repeatability	0.1%	0.1%	0.1%		0.1%
Sample Size	Thickness ≤145mm	Thickness ≤145mm	Thickness ≤145mm	30 mm×30 mm to 210 mm×297 mm (A4 Size)	Thickness ≤145mm
Memory	20000 values	Mass Storage	Mass Storage	1000 values	5000 values
Interface	USB	USB	USB	USB, U disk	USB, U disk
Power	220V/110V 50/60 Hz	220V/110V 50/60 Hz	220V/110V 50/60 Hz	AC 100-240V, 50/60Hz, 20VA	115 / 230 VAC
Dimension	310mm×215mm×540mm	598mmX247mmX366mm	598mmX247mmX366mm	340mmX294mmX473mm	670mm x 39 mmx 24mm

Haze Meter Customer Case-Glass

Area	Company Name	Industry	Sample	Parameter
China	Changjiang Automotive Electronics	Automobile	Glass	Haze, Transmittance

Sample Test Picture





Haze Meter Customer Case-Glass

Area	Company Name	Industry	Sample	Parameter
China	NOVA VISION GROUP LIMITED	Glass	Sun Glasses	Haze, transmittance, color

Sample Test Picture



Haze Meter Customer Case-Glass

Area	Company Name	Industry	Sample	Parameter
China	Fujian Heda Glass Technology Co., Ltd	Glass	AG-Glass	Haze, transmittance

Sample Test Picture



Haze Meter Customer Case-Glass

Area	Company Name	Industry	Sample	Parameter
China	Dongguan Qun'an Plastic Co., Ltd	Plastic	Plastic Sheet	Haze, transmittance

Sample Test Picture



Haze Meter Customer Case-Diffuser

Area	Company Name	Industry	Sample	Parameter
China	Jiangmen zhenchuang Photoelectric Technology Co., Ltd	Diffuser	Diffuser	Haze, transmittance

Sample Test Picture



Haze Meter Customer Case-Diffuser

Area	Company Name	Industry	Sample	Parameter
China	Foshan Xinqiao Technology Co., Ltd	Diffuser	Diffuser	Haze, transmittance

Sample Test Picture



Haze Meter Customer Case-Film

Area	Company Name	Industry	Sample	Parameter
China	Changsha University of Science & Technology	University	Plastic Film	Transmittance

Sample Test Picture



Haze Meter Customer Case-Film

Area	Company Name	Industry	Sample	Parameter
China	Gu Shi Nano Technology (Zhejiang) Co., Ltd	New Material	Conductive film	Haze, transmittance

Sample Test Picture



Haze Meter Customer Case-Screen

Area	Company Name	Industry	Sample	Parameter
China	Sichuan aiyuguang Technology Co., Ltd	Screen	Mobile Phone Screen	Haze, transmittance

Sample Test Picture



Haze Meter Customer Case-Screen

Area	Company Name	Industry	Sample	Parameter
China	Wuhan Tianma Microelectronics Co., Ltd.	Screen	Glass	Haze, transmittance

Sample Test Picture



Haze Meter After Sales Service

- ❖ 1. Warranty is one year
- ❖ 2. Instrument can pass metrology of national laboratory
- ❖ 3. Haze meter comes with the calibration certification from a third party laboratory.



Thank you!

Hangzhou CHNSpec Technology Co., Ltd