



Dear customers,

August 2018
DISCO Corporation

Terminology Revisions in Inspection and Specification Sheets for Precision Processing Tools

Firstly, we would like to express our sincere gratitude for your continued support and patronage.

As need has risen for quality management systems in the manufacturing industry, DISCO has implemented comprehensive inspections of the quality management standards and documents for precision processing tools. During these inspections, there were no critical concerns which could affect product quality. However, some minor errors and incorrect terminology requiring correction were discovered in some of the inspection and specification sheets provided to customers. Thus, these documents will be corrected to reflect the appropriate terminology when issued next.

Revisions were only made to the minor errors and terminology. No changes have been made to the products or production process. We would like customers using the applicable products to confirm the revision details.

Applicable Products and Overview

Applicable Products	Precision processing tools (Dicing blades, grinding wheels, dry polishing wheels, etc.)
Overview	<p>Some minor errors and incorrect terminology requiring correction were discovered in some of the inspection and specification sheets provided to customers. Thus, these documents will be corrected to reflect the appropriate terminology when issued next. (Please see the appendix for details regarding each product group.)</p> <p><u>Examples of Corrections</u></p> <ul style="list-style-type: none"> - Hub blades: Inspection equipment for the flatness of the base (Error correction) Surface roughness measuring device → Electric micrometer - Grinding wheels: Range of quantities for flatness accuracy (Terminology correction) or less, within, below → or less - Grinding wheels: Segment width (Terminology correction) Blade thickness → Segment width <p>*Additions may be made to the information printed on some products and labels.</p>
Date	From October 2018

Inspection Sheet

Errors will be corrected and terminology will be revised in inspection sheets for the applicable products in the appendix manufactured starting in October 2018.

Specification Sheets

Errors will be corrected and terminology will be revised in specification sheets for the applicable products in the appendix issued starting in October 2018.

Furthermore, terminology in the standard specification sheet format will be amended so that it is easier to understand.

If you have already been issued a specification sheet and require the sheet to be reissued, please contact your DISCO sales representative.

Inquiries

For inquiries, please contact your DISCO sales representative.

Revision List (1/2)

Applicable products	Item	Applicable documents	Before correction/revision	After correction/revision	Remarks	Additional information
All types	Seal of approval section on inspection sheets	• Inspection sheets	Seal or signature of product PIC	Removed the seal or signature of product PIC The results of final judgment determined by the judgment system are now displayed.	Because the automatic judgment system was adopted for final judgment of the inspection results, the seal/signature of the person responsible for the products was removed and the format was revised to match the actual situation.	Attachment 1
	Each term	• Inspection sheet • Specification sheet	There were multiple terms for the same events and sections, as well as hard to understand terminology.	Terminology standardized for clarity	Hard to understand terminology for precision processing tools has been revised and standardized. E. g., Identification number: Manufacturing number → Serial number	Attachment 2
	Criteria for external appearance inspection	• Specification sheet	Text such as “There should be no harmful defects”	Standard inspection value terminology for each type	Because some terms in the inspection criteria are unclear, they will be revised and the appearance inspection items and standard values for each product type will be noted. The standard values for each product type will be published on DISCO’s website. Note: For inspection sheets, the existing text will be used.	-
	Notations such as serial no.	• Product • Label	-	Display serial nos., expiration dates, and barcodes on the products or labels.	Almost all DISCO products have information, such as the serial no., expiration date, and part no. barcode on the products or labels. However, due to the limited space, this was not possible for all products. In order to enhance quality management, as much information as possible will be displayed. Furthermore, DISCO will transition to clearer printing methods, such as laser printing.	Attachment 3
Hub blades	Outer diameter	• Inspection sheets • Specification sheets	55.56 ± 0.02 mm	Both standards below will be displayed. • 55.58 ± 0.02 mm (In-process standard) • 55.56 + 0.05, - 0.35 mm (Finished product standard)	Terminology was revised as appropriate.	Attachment 4
	Hub parallelism	• Specification sheets	Inspection device: Surface roughness measurement device Inspection method: Measured in one direction along the diameter	Inspection device: Electric micrometer Inspection method: Measure the hub height at three points	Errors were corrected as appropriate.	-
Hubless blades	Warpage	• Specification sheets	Inspection device: Thickness gauge Inspection method: Position a blade on the plate and measure	Inspection device: - Inspection method: Position the plate and inspect visually (Only measured with feeler gauge when determined to be outside of standards during visual inspection.)	Terminology was revised as appropriate.	-
Hub and hubless blades (Angled type)	Angle resolution	• Specification sheets	10 minutes	1 degree	Errors were corrected as appropriate.	-

Revision List (2/2)

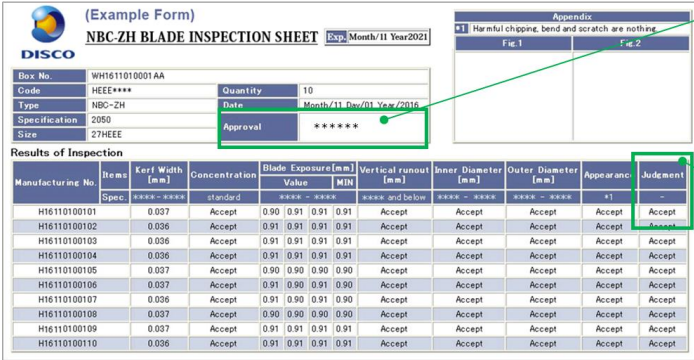
Applicable products	Item	Applicable documents	Before correction/revision	After correction/revision	Remarks	Additional information
Grinding and dry polishing wheels	Ranges for unbalance, parallelism accuracy, etc.	<ul style="list-style-type: none"> • Inspection sheets • Specification sheets 	Multiple terms existed with the same meaning. Japanese: 以内 以下 English: or less, within, (below)	Standardized multiple terms Japanese: 以下 English: or less	Standardized multiple terms which indicate ranges In addition, the English notation “below” was written in some sections of the inspection and specification sheets. This has been corrected.	-
	Unbalance units	<ul style="list-style-type: none"> • Inspection sheets • Specification sheets 	The units were described as “g” but should be written as “g·cm.”	“g·cm”	For some products, the unit “g” was mistakenly entered instead of “g·cm.” This has been corrected.	Attachment 5
	Unbalance standard values	<ul style="list-style-type: none"> • Inspection sheets • Specification sheets 	Multiple standard values existed depending on the product	Standardized the standard values based on size	Because multiple standard values existed, they were standardized to the strictest standard values based on size.	Attachment 5
Grinding wheels	Diamond lot field	<ul style="list-style-type: none"> • Inspection sheets 	The diamond lot field indicates the lot number of the diamond grit.	The diamond lot field was removed.	The lot number of the diamond grit (one of the raw materials) was indicated. However, the diamond lot field is not an item used by customers and is managed by DISCO. Thus, it has been removed.	-
Grinding wheels (Poligrind)	Inspection devices for wheel/base height measurements	<ul style="list-style-type: none"> • Specification sheets 	Dial gauge	Digital indicator	Errors were corrected as appropriate.	-
Dry polishing wheels	Pad height inspection method	<ul style="list-style-type: none"> • Specification sheets • Inspection sheets 	Pad height being measured directly using a caliper or laser displacement gauge	Pad height is measured indirectly by calculating the difference between the wheel and base heights	Errors were corrected as appropriate.	-
Dry polishing wheels (DPEG, DP08)	Inspection devices for wheel height	<ul style="list-style-type: none"> • Specification sheets 	Caliper	Laser displacement gauge	Errors were corrected as appropriate.	-

Attachment 1: Inspection Sheet Seal of Approval Section

Revision Details

The seal or signature of the person responsible for the product was displayed in the approval field on the previous inspection sheet. However, actual final judgment is made by an automatic judgment system. Thus, the seal or signature of the person responsible for the product will no longer be used and “Judgment system” will be displayed instead.

Example: Hub and hubless blade notation format



(Example Form)
NBC-ZH BLADE INSPECTION SHEET [Exp. Month/11 Year2021]

Box No. WH1611010001AA
Code HEE****
Type NBC-ZH
Specification 2050
Size 27HEEE

Quantity 10
Date Month/11 Day/01 Year/2016
Approval *****

Results of Inspection

Manufacturing No.	Items	Kerf Width [mm]	Concentration	Blade Exposure [mm]			Vertical runout [mm]	Inner Diameter [mm]	Outer Diameter [mm]	Appearance	Judgment
				Value	MIN	MAX					
H16110100101	0.037	Accept	0.90	0.91	0.91	Accept	Accept	Accept	Accept	Accept	
H16110100102	0.036	Accept	0.91	0.91	0.91	Accept	Accept	Accept	Accept	Accept	
H16110100103	0.036	Accept	0.91	0.91	0.91	Accept	Accept	Accept	Accept	Accept	
H16110100104	0.036	Accept	0.91	0.91	0.91	Accept	Accept	Accept	Accept	Accept	
H16110100105	0.037	Accept	0.90	0.90	0.90	Accept	Accept	Accept	Accept	Accept	
H16110100106	0.037	Accept	0.91	0.90	0.91	Accept	Accept	Accept	Accept	Accept	
H16110100107	0.036	Accept	0.91	0.90	0.91	Accept	Accept	Accept	Accept	Accept	
H16110100108	0.037	Accept	0.90	0.90	0.90	Accept	Accept	Accept	Accept	Accept	
H16110100109	0.037	Accept	0.91	0.91	0.91	Accept	Accept	Accept	Accept	Accept	
H16110100110	0.036	Accept	0.91	0.91	0.91	Accept	Accept	Accept	Accept	Accept	

Previous

Approval	Signature of the person responsible for the product
----------	---

➔

New

The seal and signature of approval were removed

Previous

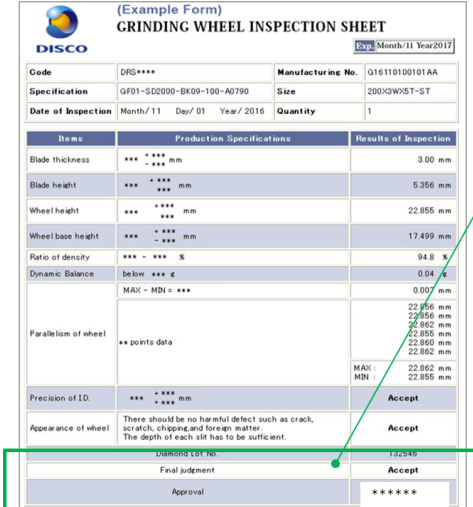
Item	judgment
Spec. *****	-
	Pass

➔

New

Final judgment	Judgment system
	Pass

Example: Grinding / dry polishing wheel notation format



(Example Form)
GRINDING WHEEL INSPECTION SHEET [Exp. Month/11 Year2017]

Code DRG****
Specification GF01-S02000-BK09-100-A0790
Date of Inspection Month/11 Day/01 Year/2016
Quantity 1

Manufacturing No. G16110100101AA
Size 200X200X-T-ST

Items	Production Specifications	Results of Inspection
Blade thickness	*** - **** mm	3.00 mm
Blade height	*** - **** mm	5.356 mm
Wheel height	*** - **** mm	22.855 mm
Wheel base height	*** - **** mm	17.499 mm
Ratio of density	*** - **** %	94.8 %
Dynamic Balance	below *** g	0.04 g
Parallelism of wheel	** points data	MAX: 22.856 mm
		MIN: 22.855 mm
		MAX: 22.860 mm
		MIN: 22.855 mm
Precision of I.D.	*** - **** mm	Accept
Appearance of wheel	There should be no harmful defect such as crack, scratch, chipping and foreign matter. The depth of each slit has to be sufficient.	Accept
Diamond Lot No.	TS2546	
Final judgement		Accept
Approval		*****

Previous

Inspection item	Standard	Inspection results
Overall judgment		Pass
Seal of approval		Signature of the person responsible for the product

➔

New

Inspection item	Standard	Inspection results
Final judgment	Judgment system	Pass

Note: The above are examples of the standard inspection sheet format published on DISCO's website.

Attachment 2: Terminology Standardization

Revision Details

Hard to understand terminology for precision processing tools has been revised and standardized.

Examples of Standardized Terms

Applicable products	Event and location	Before correction	After correction	Reference
All types	Number for individual identification	Manufacturing no., Product no., etc	Serial no.	Figure 1
	Product type identification code	Code	Product code	
Grinding and dry polishing wheels	Unbalance	Dynamic balance	Unbalance	
Grinding wheels	Segment section width	Blade thickness, Tooth thickness	Segment width	Figure 2
	Segment section height	Blade height, Blade exposure, Tooth height	Segment height	Figure 3
	Segment section density	Ratio of density	Average density ratio	
	Segment section strength	Flexure strength, Bending strength	Segment strength	
Dry polishing wheels	Pad height	Usable tooth	Pad height	
	Pad hardness	Pad hardness ratio	Average hardness ratio	



Figure 1. Example of serial no. (hub blade)

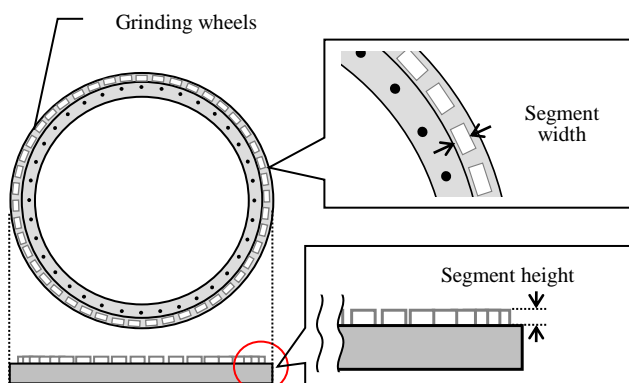


Figure 2. Grinding wheels

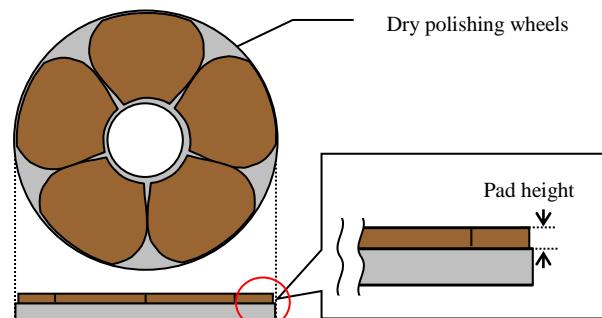


Figure 3. Dry polishing wheels

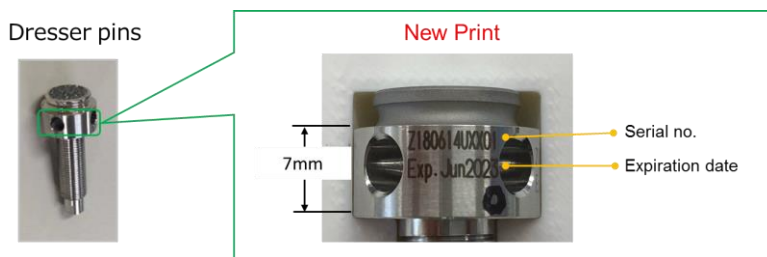
Attachment 3: Information on Products and Labels

Overview

Almost all DISCO products have information, such as the serial no., expiration date, and barcode, on the products or labels. However, due to the limited space, this was not possible for all products. In order to enhance identification of individual items and improve convenience, as much information will be displayed as possible. Furthermore, DISCO will transfer to clearer methods of printing onto products, such as laser printing. Some examples are shown below:

Example: Serial no. and expiration date on products (Dresser pins)

Because the display area for the dresser pins used to auto dress dry polishing wheels is limited to a small space, the serial no. and expiration date were not printed on those products. For the purpose of enhancing individual identification, information will be printed on products manufactured starting in October 2018.



Example: Serial no. barcode on labels (Dry polishing wheels)

Although two barcodes (serial no. and part no.) are displayed on labels on grinding wheel cases, they were not displayed on dry polishing wheels. For the purpose of improving the convenience of individual identification, information (serial no. and part no.) will be printed on products manufactured starting in October 2018.



Note: The photograph shows the standard label layout.

Example: Transition to clearer printing method (Electrodeposition dresser board)

An electrolysis printing method was adopted for electrodeposition dresser boards. However, the printing method will be replaced with laser printing on products manufactured starting in October 2018. In addition, the expiration date will also be displayed.



Attachment 4: Hub Blade Outer Diameter Dimensions

Revision Details

In the existing hub blade specification sheets, the outer diameter dimension was described as a target value, which was unclear. Thus, in the new specification sheets, this will be revised to the standard value of the in-process inspection, and a final completed product inspection will also be added. In addition, the outer diameter standard value written in the inspection sheets will be revised.

Notation in Existing Specification Sheets

Item	Outer Diameter
Standard value	55.56 ± 0.02 mm
Inspection device	Micrometer
Inspection method	Measure two directions (X and Y directions) (Measured while mounted on outer diameter finishing equipment)
Explanation	The standard value (55.56 ± 0.02 mm) was written as a target value for the end products that passed the in-process inspection.

Notation in the New Specification Sheets

Item	Outer diameter (in-process)
Standard value	55.58 ± 0.02 mm
Inspection device	Micrometer
Inspection method	X- and Y-direction measured while mounted during OD processing
Explanation	This will be specified as the value from the in-process inspection, and the standard value will be corrected to 55.58 ± 0.02 mm, which is the actual value.

Terminology revision

+

Item	Outer diameter (finished product)
Standard value	55.56 + 0.05 mm, -0.35 mm
Inspection device	Equipment manufactured by DISCO
Inspection method	Image measured when the product is completed
Explanation	A non-contact image analysis measurement inspection will be added.

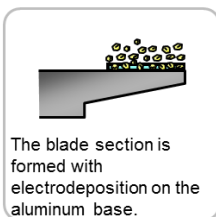
Additional inspection

Background for the In-process Inspection Value Correction

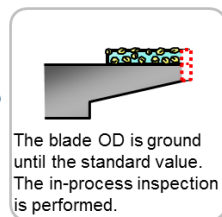
With an outer diameter of 55.56 ± 0.02 mm for the finished hub blade as a goal, the in-process inspection was performed with a criterion of 55.58 ± 0.02 mm during the “(2) the outer diameter grinding process.” Assuming the wear amount from dressing and precut during the “(4) finishing process” is approx. 0.02 mm, an outer diameter (55.58 mm) 0.02 mm larger than the finished product target value (55.56 mm) was set as the standard value.

● Standard Hub Blade Manufacturing Process

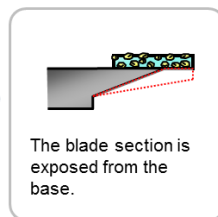
(1) Forming Process



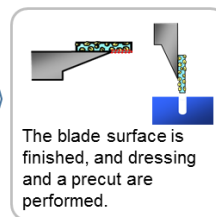
(2) OD Grinding Process



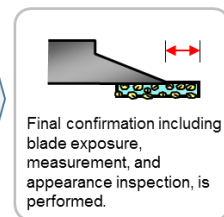
(3) Blade Exposure Process



(4) Finishing Process



(5) Final Inspection Process



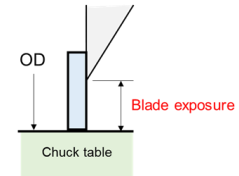
However, due to the diversification of hub blade types in accordance with customer requests processes, the wear amount in the “(4) finishing process” does not have to be 0.02 mm, and the outer diameter for some finished products actually deviated from the previous assumption. Thus, 55.56 ± 0.02 mm, which was written as the target value for finished products, will no longer be used, and only 55.58 ± 0.02 mm, the standard value during the in-process inspection in the “(2) outer diameter grinding process” will remain.

Background of Additional Inspection for Finished Products

In order to set the detected blade edge as the reference position during setup, the blade exposure measured in “(5) the final inspection process” was inspected. However, non-contact measurements of the outer diameter of finished products are enabled. Thus, an inspection will be added.

- Reference Position Detection Using Setup

The important dimension when used is blade exposure because the top surface of the chuck table and the blade edge are detected as a reference position by conducting setup after equipment installation. The exposure amount is also an element which could significantly affect processing or blade life.



The most recent changes are terminology revisions in the specification and inspection sheets and the addition of an inspection. No changes have been made to the products.

Attachment 5: Unbalance Units and Standard Values for Grinding / Dry Polishing Wheels

Revision Details

On the inspection and specification sheets for some products, there were errors in the units for unbalance. These were corrected. In addition, multiple standard values existed for individual products, so they were standardized to the strictest standards based on size.

Item	Previous	Revised
Units for unbalance	Both “g” and “g·cm” were used.	Standardized as “g·cm”
Standard values for unbalance	Multiple standards existed depending on the product.	Standardized based on size

Units and Standard Values for Each Product

●Grinding Wheels

Outer Diameter	Previous	Revised
Less than ϕ 200 mm	0.08 g	0.08 g·cm
	0.080 g	
	0.08 g·cm	
ϕ 200 mm	0.125 g 1.25 g·cm	1.25 g·cm
ϕ 250 mm	0.5 g 6.25 g·cm	0.50 g·cm
ϕ 280 mm	1.5 g 2.1 g·cm	1.50 g·cm
ϕ 300 mm	1.5 g 22.5 g·cm	1.50 g·cm
ϕ 350 mm	1.5 g	1.50 g·cm
ϕ 400 mm	1.5 g 30.0 g·cm	1.50 g·cm

●Dry Polishing Wheels

Series	Outer diameter	Previous	Revised
DPEG, DP08	ϕ 450 mm	50 g·cm	50.00 g·cm
DP-F05	ϕ 300, 350 mm	1.5 g	1.50 g·cm
	ϕ 450 mm	2 g	2.00 g·cm
DPSA	ϕ 230, ϕ 250, ϕ 300 mm	100 g·cm	100.00 g·cm