

HANDLE CASE PAPER PART SPECIFICATIONS

TCAU Specification

TSA 240

Issue: 1

July 2010

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The following Technicolor Specification shall be considered Confidential in nature. Each person or persons in receipt of this specification shall not disclose any confidential information in whole or in part without written authorisation from Technicolor.

1. Description

The Handle Case is a plastic, single media box for DVD, designed for the children's market.

2. Scope

These specifications shall apply to all plastic, single media Handle Case boxes purchased by Technicolor.

3. Requirements

- ♦ The Handle Case Specification requires that the plastic box media packaging for DVD must meet Technicolor specifications and applicable license and trademark. Plastic box media packaging for DVD may or may not be from current Technicolor approved/qualified suppliers; however, the supplier must complete the qualification process for Handle Case box product. The Handle Case box must not cause functional problems in any type of production equipment in use by Technicolor.
- ♦ Each container/shipment is considered an individual lot for inspection. This specification includes additional testing requirements for incoming inspection to reduce the risk of materials causing functional failures in production equipment. Additional testing includes, but is not limited to, functional testing in production equipment.
- ♦ Any revisions and/or additions to these specifications are to be made with the agreement of Technicolor and the supplier. Technicolor must be notified of and agree to any changes to Handle Case box materials, design and/or construction.
- ♦ It is recommended that the test methodologies described herein be used. However, alternative methods will be accepted if the test criteria and repeatability can be maintained.
- ♦ All test samples should be acclimated prior to test. All tests should also be conducted in a standard testing environment of:
 - Temperature: 20±2°C
 - Relative Humidity: 50 +10%
- ♦ All supplied product must be pre-approved by the following packaging equipment manufacturers for use on their automatic packaging equipment:
 - Heino Ilsemann
 - Kyoto

Note: Drawings Not To Scale

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4. Dimensional Characteristics

4.1 Dimensional Table

The following table (Table 1) provides the various dimensional specifications of the Handle Case. All dimensions given are in millimetres (mm).

Table 1 - Dimensional Requirements

Item	Parameter	Reference		Test Method	Specification		Defect Class
		Section	Figure		Min	Max	
D1	Case Length	4.2	Figure 1a	Caliper	190.2	192.0	Critical
D2	Case Width (closed)	4.2	Figure 1a	Caliper	135.1	136.5	Critical
D3	Case Width (open)	4.2	Figure 1b	Steel rule, caliper	282.0	284.0	Critical
D4	Case Depth (spine)	4.2	Figure 1a	Caliper	14.7	15.3	Critical
D5	Gap Between Halves	-	-	Slip gauge	0.03	0.05	Major
D6	Finger slot	Appendix A	M-001-RHC	Steel rule, caliper	85.0	95.0	Critical
D7	Flatness	-	-	Slip gauge, dial indicator	---	1.0	Major
D8	Weld to Weld (ID) [#]	4.3	Figure 2	Weld width gauge	274.0	274.5	Critical
D9	Film Length	4.3	Figure 3	Caliper	120.0	120.5	Major
D10	Film Offset from Bottom	4.3	Figure 3	Steel rule	18.0	20.0	Critical
D11	Film Thickness	-	-	Caliper	0.9	1.2	Major
D12	Lid Thickness	-	-	Caliper	TBA	TBA	Major
D13	Base Thickness	-	-	Caliper	TBA	TBA	Major
D14	Book Tab (CL)	-	-	Caliper	TBA	TBA	Critical
D17	Disc Rib Height	-	-	Height gauge	TBA	TBA	Critical
D18	Disc Ring Periphery ID	Appendix A	M-002-RHC - diameter F	Caliper	120.4	121.8	Critical
D19	Handle Offset from Top	Appendix A	M-002-RHC - dimension A	Caliper	15.0	16.0	Critical
D20	Handle Offset from Side	Appendix A	M-002-RHC - dimension B	Caliper	20.0	21.0	Critical
D21	Handle Hole Thickness	Appendix A	M-002-RHC - dimension C	Caliper	20.0	20.5	Major
D22	Handle Hole Length	Appendix A	M-002-RHC - dimension D	Caliper	92.0	92.5	Critical
D23	Handle Display Mount ID	Appendix A	M-002-RHC - diameter E	Caliper	9.5	10.0	Minor
D24	Bottom Ex. Case Wall - Top Booklet Clip CL	-	-	Steel rule	TBA	TBA	Minor
D25	Bottom Ex. Case Wall - Bottom Booklet Clip CL	-	-	Steel rule	TBA	TBA	Minor

[#] weld strength testing must be performed prior to weld width testing

Note: Drawings Not To Scale

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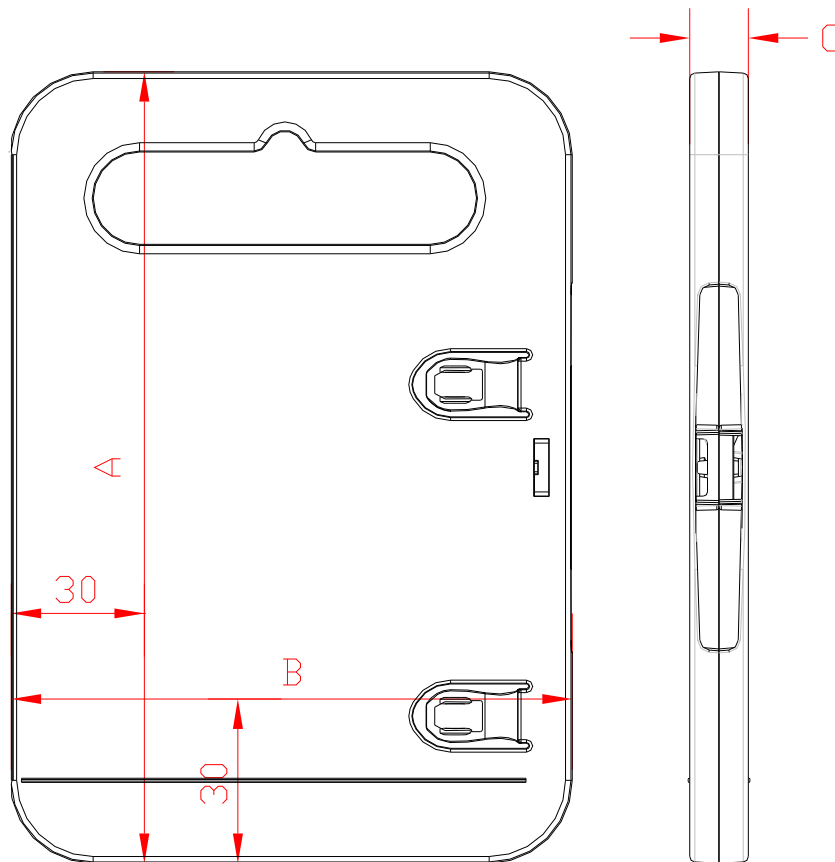
4.2 External Box Dimensions

So as to ensure reproducibility of external box measurements, dimensions D1, D2 and D4 should be measured with reference to the external measurement positions specified in table 2 and shown in figures 1a and 1b.

Table 2 – External Measurement Positions

Dimension (mm)	A	B	C
	Length	Width (closed)	Depth
Reference position for measurement	30	30	Top & Bottom
Minimum	190.2	135.1	14.7
Maximum	192.0	136.5	15.3

Figure 1a – Handle Case Box, External Dimensions (closed)



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4.3 Weld Width

Weld to Weld – the distance between the inner edges of the welds. See Figure 2.

- ♦ Using callipers, measure the distance between each weld I.D.

Note: Measurement performed while placing appropriate weight on the box to stabilize and flatten box under test

Figure 2 – Weld to Weld Measurement

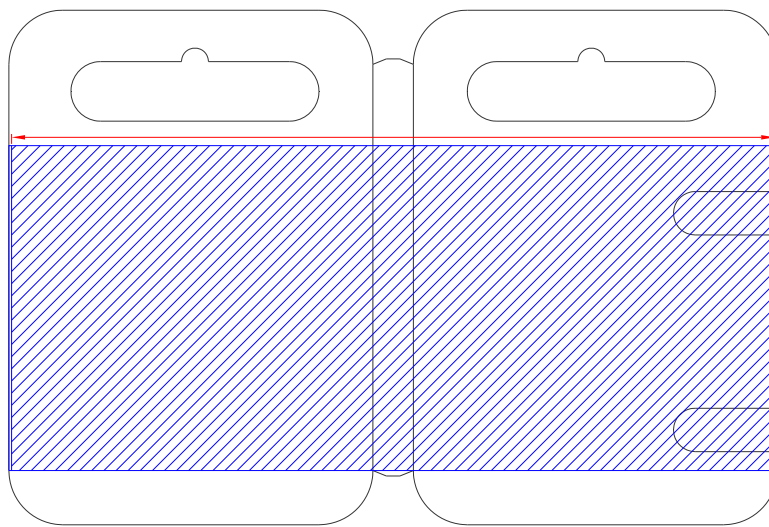
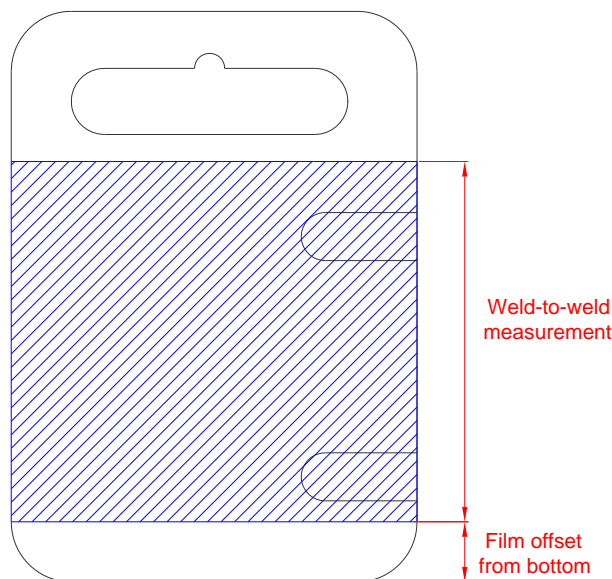


Figure 3 – Film Characteristics



Note: Drawings Not To Scale



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5. Physical Characteristics

The following physical requirements apply to all Handle Cases. Refer Table 3.

Table 3 – Physical Requirements

Item	Parameter	Reference	Test Method	Specification	Defect Class
PH1	Box w/ Film Weight * No more than 5.0 grams variance within the listed range for each mold set.		Scale	Type 1: 80-87g	Critical
				Type 2: 72-79g	
				Type 3: 64-71g	
				Type 4: 56-63g	
PH2	Hub Flash		Visual	None	Major
PH3	Wall Flash		Slip gauge	0.2mm max.	Minor
PH4	Latch Flash		Slip gauge	0.1mm max.	Minor
PH5	Spine Flash		Slip gauge	0.2mm max.	Minor
PH6	Parting Line Flash		Slip gauge	0.2mm max.	Minor
PH7	Mold Number		Visual	Legible	Major
PH8	Texture – similar to MT 11520 or VDI 30 Rz .0009"		Applicable	Matte inside, matte or polished outside.	Major
PH9	Color Shade: -001 Grey (Pantone 433C) -002 White (GE-80527) -003 Black	ASTM-D-2244	Use Cool White Fluorescent light, color reference, ASTM-D-2244.	White – GE80527 S003267 Grey – 433C	Major

6. Cosmetic Characteristics

The following cosmetic requirements apply to all Handle Cases. Refer Table 4.

Table 4 – Cosmetic Requirements

Item	Parameter	Reference	Test Method	Specification	Defect Class
C1	Film Appearance		Visual	Free of the following: ripple, drag marks, bubbles, color variation, damage or tears, consistent clarity.	Minor
C2	Weld Appearance		Visual	No strings, over-edge, or burns.	Minor
C3	Short Shot		Visual	Not visible, fully functional.	Minor
C4	Grease		Visual	Not allowed	Minor
C5	Colour variation, sink mark, or scratches		Light assisted visual	Not allowed	Minor
C6	Tears or Cracks		Visual	Not allowed	Minor
C7	Flow Lines		Visual	Not allowed	Minor
C8	Film Alignment		Visual	Within & parallel to upper and lower lands.	Major
C9	Dirt/Contamination		Visual	Not allowed	Minor

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7. Performance Characteristics

All Handle Cases must satisfy the following performance characteristics. Refer Table 5.

Table 5 – Performance Requirements

Item	Parameter	Reference		Test Method	Specification	Defect Class
		Section	Figure			
P1	Weld Strength	7.1	4 & 5	Weld Strength Fixture, visual	No failure	Critical
P2	Hub Engagement	7.2.1	-	Manual	Smooth and secure	Critical
P3	Hub Operating Force	7.2.2	7 & 8	Test weight	1000g	Critical
P4	Hub Release [#]	7.2.3	-	Manual, visual	Smooth release	Major
P5	Hub Longevity	-	-	Manual	No deformation after 10 trial hub engagement & release trials	Major
P6	Hub Engagement Height	7.2.1	6	Height gauge	4.6 - 6.5mm	Critical
P7	Disc Removal Force: - Button Hub - Non Button Hub	7.2.2	8	Handheld Force Gauge	Min 200g 200-400g	Major
P8	Disc Land Height	7.2.5	10	Height gauge	3.0 - 5.0mm	Critical
P9	Upper Nesting Limit	7.2.6	11	Manual, slip gauge	2.5mm max	Major
P10	Lower Nesting Limit	7.2.7	11	Manual, visual	Free rotation	Major
P11	Hinge - Relaxation and Rebound	7.3.1	12	Manual, protractor	10° max after 180° opening.	Major
P12	Hinge - Flex	7.3.2	-	Manual, visual, protractor	>270° without distortion.	Major
P13	Drop test: - Hub - Latch - Booklet Clips	7.4.1	13	450mm, visual - refer Figure 5	No hub, latch or media damage.	Critical
P14	Latch Strength - Open & Close	7.5	14 & 15	Latch Strength Fixture	500g (4.8N) min - 1225g (12N) max.	Critical

Hub Release test applicable for Button hubs only.

The DVD used in performance testing must meet the dimensional requirements specified in Table 6.

Table 6 – Test DVD Dimensional Requirements

Parameter	Specification	
	Min.	Max
Outer Diameter	119.70mm	120.30mm
Centre Hole Diameter	15.05mm	15.10mm
Thickness - data area	1.20mm	1.30mm
Thickness - clamping (centre hole)	1.10mm	1.40mm
Rotational run out of outer edge	-	0.30mm (peak -peak)
Deviation from flat	-	0.60mm (peak - peak)

Note: Drawings Not To Scale

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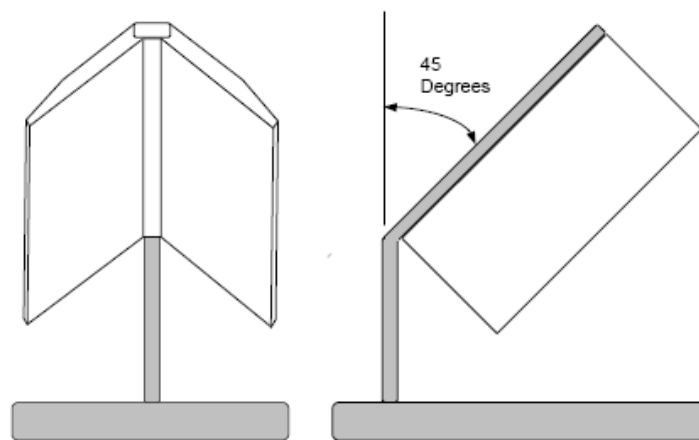
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7.1 Weld Strength

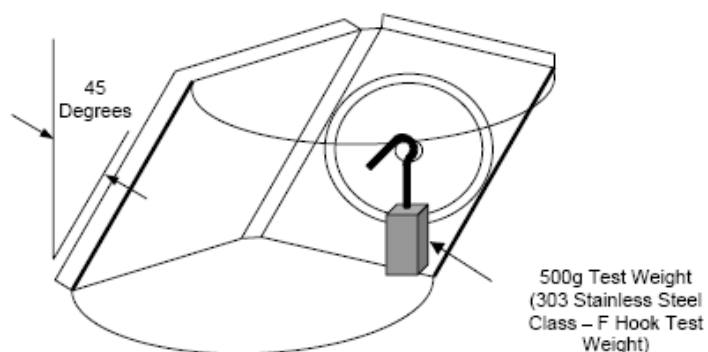
- ♦ Weld Strength testing must be performed prior to any weld width testing.
- ♦ Open the lid of the box under test through approximately 280° of opening and place the box onto the Weld Strength fixture (see Figure 4) so that the overlay film hangs below the beam.

Figure 4 - Weld Strength Test Fixture



- ♦ Carefully place the hooked 500g (4.8N) testing weight at the centre of the hanging film. Slowly allow the weight to take up the slack until the weight is fully engaged with the film and centred. Allow the test weight to hang for a minimum of 2 seconds (see Figure 5).

Figure 5 – Weld Strength Test



- ♦ Remove the test weight. Rotate the box under test so as to engage the opposite end of the film and repeat the test.
- ♦ No damage to welds shall be observed.

Note: Drawings Not To Scale

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7.2 Hub Performance

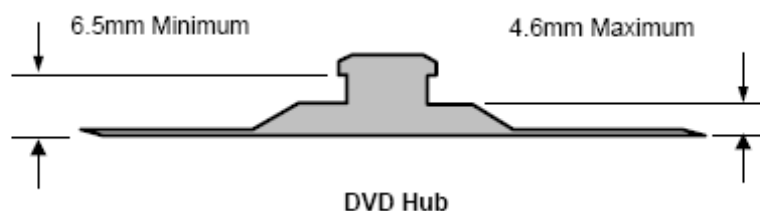
A test DVD media which satisfies all of the dimensional characteristics specified in Table 6 must be used for testing hub performance.

7.2.1 Hub Engagement Height

- ♦ Place the test DVD media over the hub and push down evenly with fingertips onto the DVD.

Note: The action is smooth as the DVD rides over the hub surfaces and is securely engaged by the hub lands (see Figure 6). Test may be repeated.

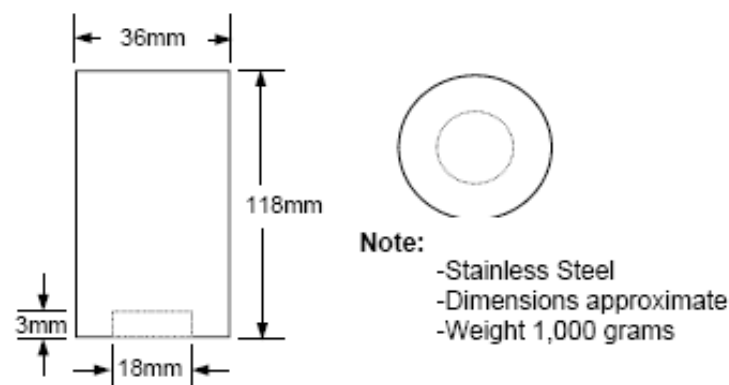
Figure 6 – Hub Engagement



7.2.2 Hub Operating Force

- ♦ To assure that the force required to fully engage the DVD media onto the hub lands is not greater than 1,000 grams, refer to Figure 8. Use of test DVD, 1000g test weight (Figure 7) and smooth weight placement is required.

Figure 7 - Hub Operating Force 1,000g Test Weight



Note: Drawings Not To Scale

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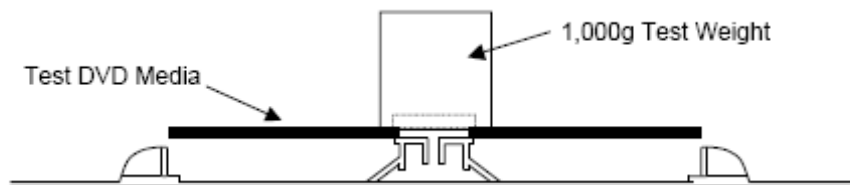
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Figure 8 – Operating Force Check



7.2.3 Hub Release

- ♦ Observe that the test DVD media is fully engaged with the hub. Press against the centre of the hub to release the test DVD media. When hub is released, test DVD media should be released from the hub and raised up by the hub.

Note: Hub Release test applicable for Button hubs only.

7.2.4 Disc Removal Force

- ♦ To ensure the force required to remove the disc from the hub fulfils specification use a hand held dial type force measurement gauge with a small hook on the end (refer Figure 9) and snap the test DVD media into place on the case hub.

Figure 9 - Disc Removal Force Testing



- ♦ Place the hook under the disc at the finger recess opening, pull up the disc by the hook until the disc comes off the hub.
- ♦ For Button hubs, the disc removal force without pushing the hub should be greater or equal to 200g.
- ♦ For non Button hubs, the disc removal force should range from 200-400g.

7.2.5 Disc Land Height

- ♦ Using a height gauge, measure the Disc Land Height (refer Figure 10).

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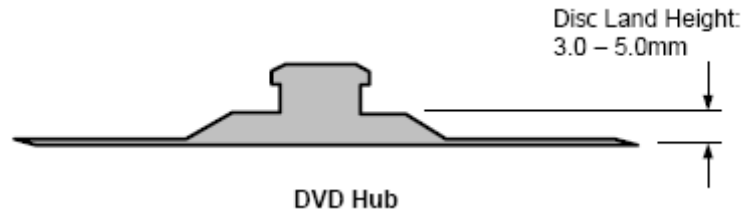
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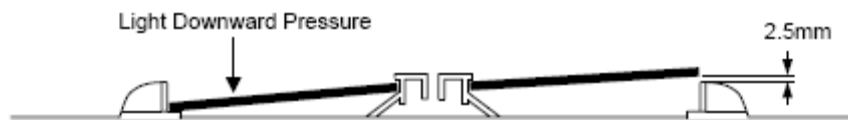
Figure 10 – Disc Land Height



7.2.6 Upper Nesting Limit

- ♦ Ensure that the test DVD media is fully engaged with the hub.
- ♦ Gently press on the edge of the media with index finger so that bottom of media is contacting inner support rim.
- ♦ Measure diagonally opposite index finger to insure that bottom of media rises no more than 2.5 mm above rim of circle mould (see Figure 11).

Figure 11 – DVD Media Nesting Height



7.2.7 Lower Nesting Limit

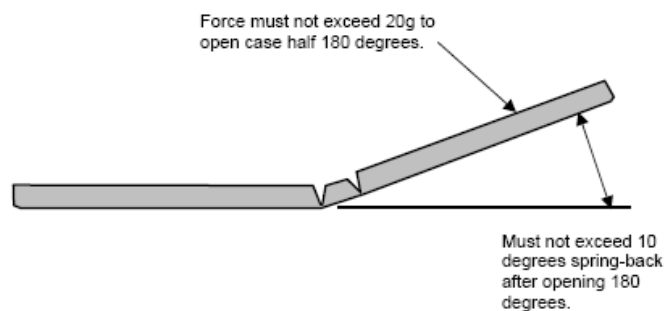
- ♦ To ensure that the test DVD media is fully engaged with the hub, using finger pressure, make sure media rotates freely. Media distortion indicates failure.

7.3 Hinge Performance (Tenting)

7.3.1 Relaxation, Rebound and Opening Force

- ♦ The *first* opening of the box lid shall be to 180° of opening. Opening force must not exceed 20g during movement.
- ♦ After opening, the lid must not exceed 10° rebound (see Figure 12).

Figure 12 – Hinge Performance



Note: Drawings Not To Scale

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7.3.2 Flex

- ♦ The hinge must be able to flex through 270° without distortion.

7.3.3 Operation Modifiers

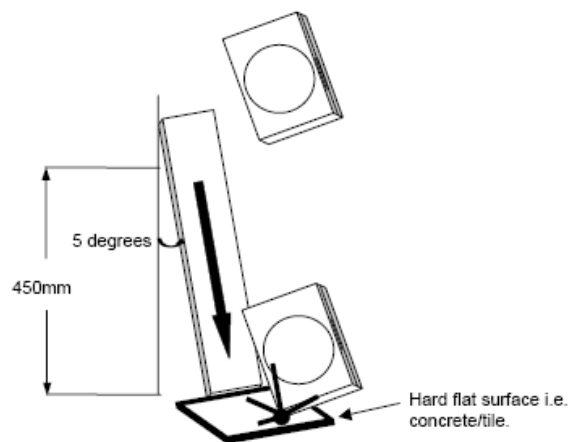
- ♦ Hinge operating characteristics may be affected by colorant used and ambient temperature.

7.4 Drop Test

7.4.1 Hub, Latch and Clip

- ♦ The performance of the booklet clips and disc hub is tested by the insertion of a 3mm test gauge (refer Appendix A) under both booklet clips and the test media secured on the hub.
- ♦ Orient box onto drop test fixture (see Figure 13) and test all corners and sides.

Figure 13 – Drop Test



- ♦ After each test, assure that the DVD media is protected and secure and the booklet clips are not broken or fractured.

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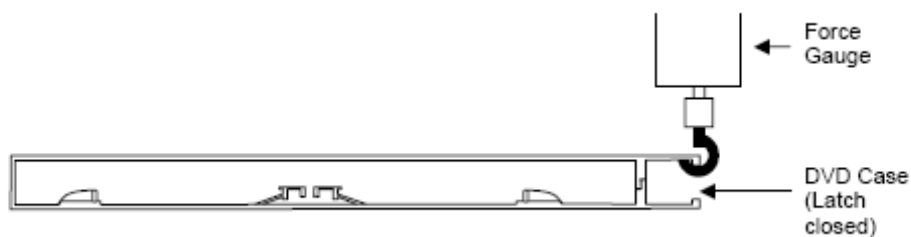
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7.5 Latch Strength

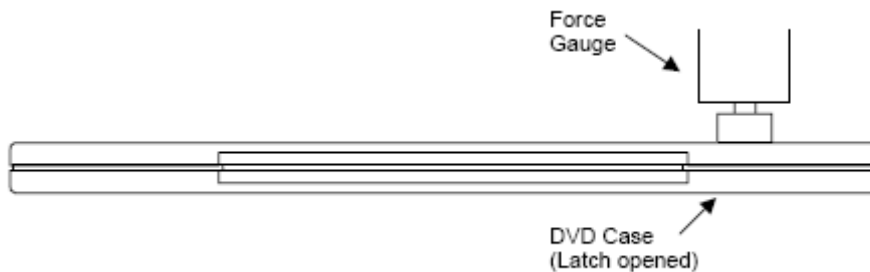
- ♦ Verify that the box under test is correctly closed and latched.
- ♦ Close the case and engage the latch with the force gauge.
- ♦ Pull up the force gauge until the latch is fully released, read and record the force gauge reading (see Figure 14).

Figure 14 – Latch Opening Strength Fixture



- ♦ Keeping the latch opened, position the force gauge on one of the latches, push down the force gauge until the latch is fully closed. Read and record the force gauge reading (see Figure 15).

Figure 15 – Latch Closing Strength Fixture



- ♦ Repeat the test with the other latch.

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8. Quality and Qualification

8.1 Defect Classification

8.1.1 Critical Defects

- ♦ Critical defects are defined as follows using Pass/Fail criteria:
 - ♦ Damaged, malformed, or non-performing parts that will impair functional performance and manufacturing operations.
 - ♦ Early part failure caused by serious dimensional, cosmetic, or manufacturing defects.
 - ♦ Deviation from defined materials, colour, or embossing.
 - ♦ Parts that fail intended design functions.
 - ♦ Defects or materials that result in a hazardous or unsafe condition to those handling the product.

8.1.2 Major Defects

- ♦ Major defects are defined as defects that decrease product value:
 - ❖ Colour variation in a DVD box.

8.1.3 Minor Defects

- ♦ Minor defects are defined as defects that decrease quality, performance and functionality of the product:
 - ❖ Colour variation between DVD boxes.
 - ❖ Minor embossing faults.

8.2 Acceptable Quality Level (AQL) Sampling

- ♦ Samples for AQL sampling shall be performed in accordance with ANSI/ASQC Z 1.4, Level 1, Double Normal and taken randomly from each shipment.
 - ❖ **Critical Defects** - AQL of 0.65
 - ❖ **Major Defects** - AQL of 2.5
 - ❖ *Minor Defects* - AQL of 4.0

8.3 DVD Box Qualification

- ♦ DVD Box Qualification process, reference 'Single DVD Box Qualification Report', Form FN0H3182DPK-001.
- ♦ Also reference 'DVD Box Mold Acceptance Procedure', P-N0H3182DPK-001.

8.4 Receiving Inspection

- ♦ Receiving Inspection process, reference 'Single DVD Box Receiving Inspection Report', Form F-N0H3182DPK-002.
- ♦ Also reference 'Receiving Inspection', Standard Procedure 4.10-1.

8.5 Packaging

- ♦ See S-3000, DVD Pallet Configuration, Container & Trailer.

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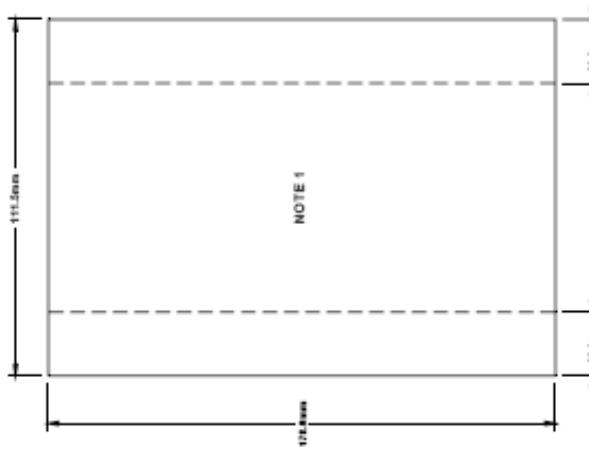
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Appendix A

DATE	REV	DESCRIPTION	REV.	REV.
24-JUL-02	-	FIRST RELEASE		N/C




NOTE 1



NOTE 1

NOTE 1: WEIGHT - 80.0 GRAMS.
ADJUST GAUGE WEIGHT
BY DRILLING COMPENSATION
HOLES IN DEFINED AREA.

DRAWING NUMBER: G-NOH3182DPK-008	OWNER: DION JOHNSTON GA MANAGER	DATE: 24-JUL-02	REV. N/C
DRAWING DESCRIPTION: 3mm CLIP TEST GAUGE	DRAFTER: ART OSBOURN GA ENGINEER	DATE: 24-JUL-02	
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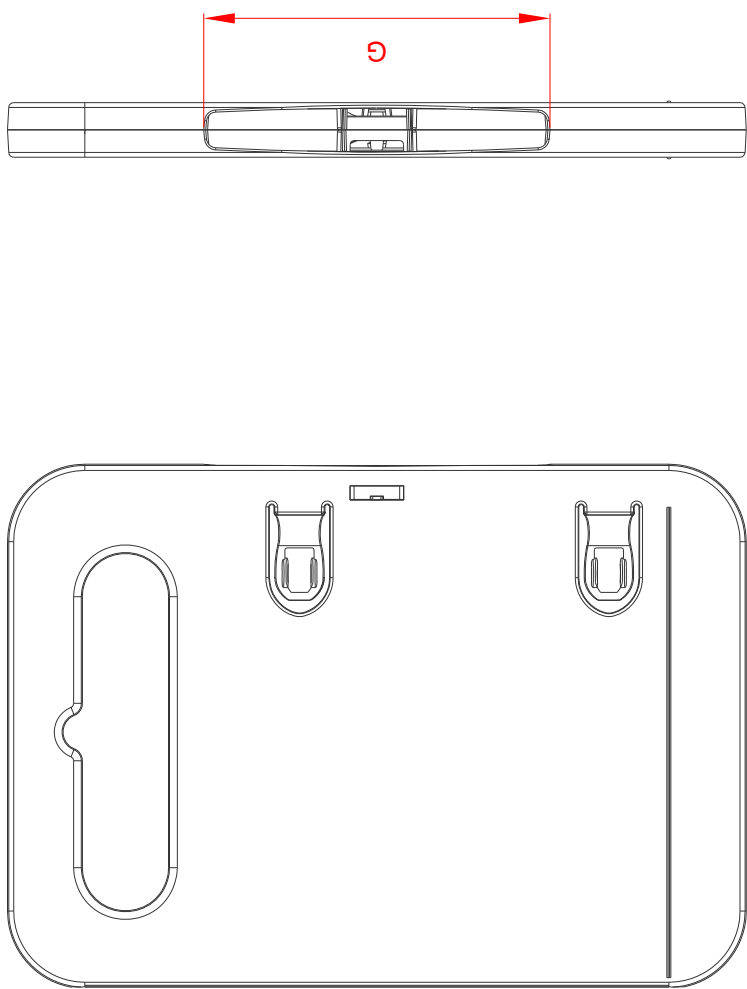
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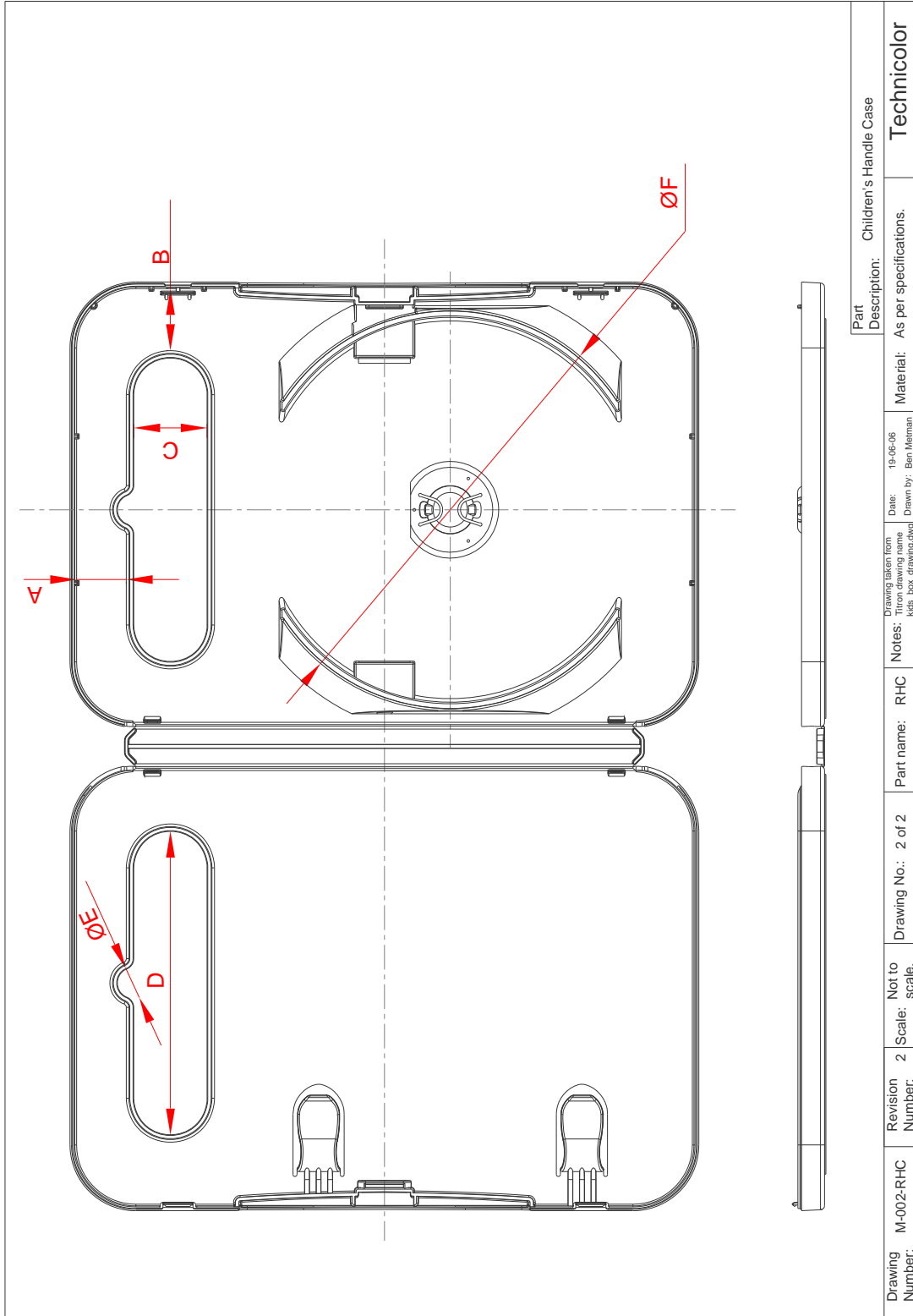
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