



International LLC

LONG LIFE GUN BARREL TESTS



**George E. Kontis
October 19, 2021**

Approved for public release by Gun IQ International LLC



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HISTORY

- * 2018 PAPER -SUPERIOR GUN BARREL MATERIALS
 - * METALLURGICAL DATA/ LAB TESTING
 - * GKH & ARMAD—PRODUCED BY AUBERT & DUVAL
- * 2020/2021--LIVE FIRE TESTING—60 K rounds
 - * CONTROL SAMPLE—Mil-B-11595 (41V45)
- * TEST RESULTS





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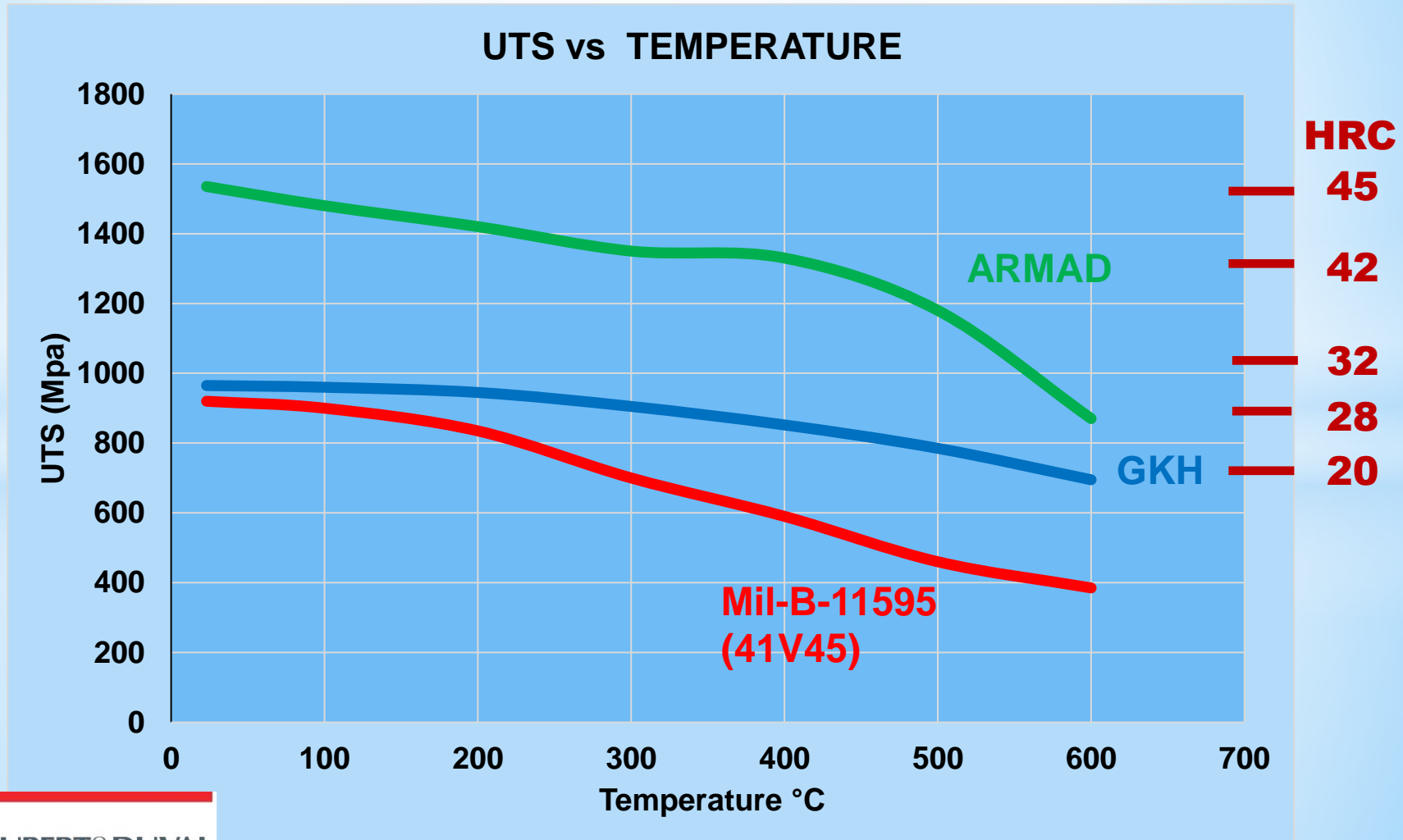
CHEMICAL COMPOSITION

| Analysis | C | Cr | Mo | S | P | Si | Mn | V | Ni |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| GKH | 0.325 | 3.00 | 1.00 | 0.007 | 0.008 | 0.300 | 0.550 | 0.300 | 0.080 |
| ARMAD | 0.325 | 3.00 | 1.00 | 0.001 | 0.005 | 0.169 | 0.217 | 0.300 | 0.080 |
| CrMoV Mil-B-11595 | 0.450 | 0.970 | 0.350 | 0.040 | 0.040 | 0.270 | 0.700 | 0.250 | --- |



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HOT HARDNESS





Capt. Robert W. Landies III, USMCR
Vice President of Manufact

International LLC

TEST EQUIPMENT

M240—7.62mm Machine Gun

Ohio Ordnance Works

- ✓ ESTABLISHED BACKGROUND IN M240 PRODUCTION
- ✓ MIL-SPEC TEST PROCEDURES:

TEST BARRELS:

ARMAD: HRC 40

GKH: HRC 28

Mil-B-11595: HRC 30

BUTTON RIFLED
BORES: HARD CHROME



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TEST PARAMETERS

Endurance firing schedule: MIL-DTL-63314

- * 250 rds./barrel—air cool
- * Measurements/Data at 1250 rds.
- * Fixed mount
- * Ball ammunition





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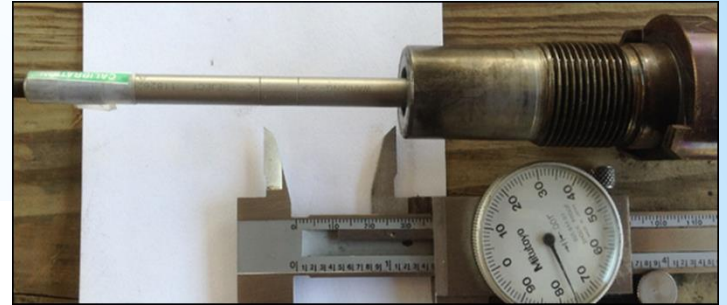
FAILURE CRITERIA

If one of the following occur- barrel has failed:

1. Muzzle Velocity: Drop below 200 ft./sec from new barrel measurements
2. Stability: 20 % of rounds with yaw of 15° or more
3. Extreme spread exceeds 30 cm



GAGES

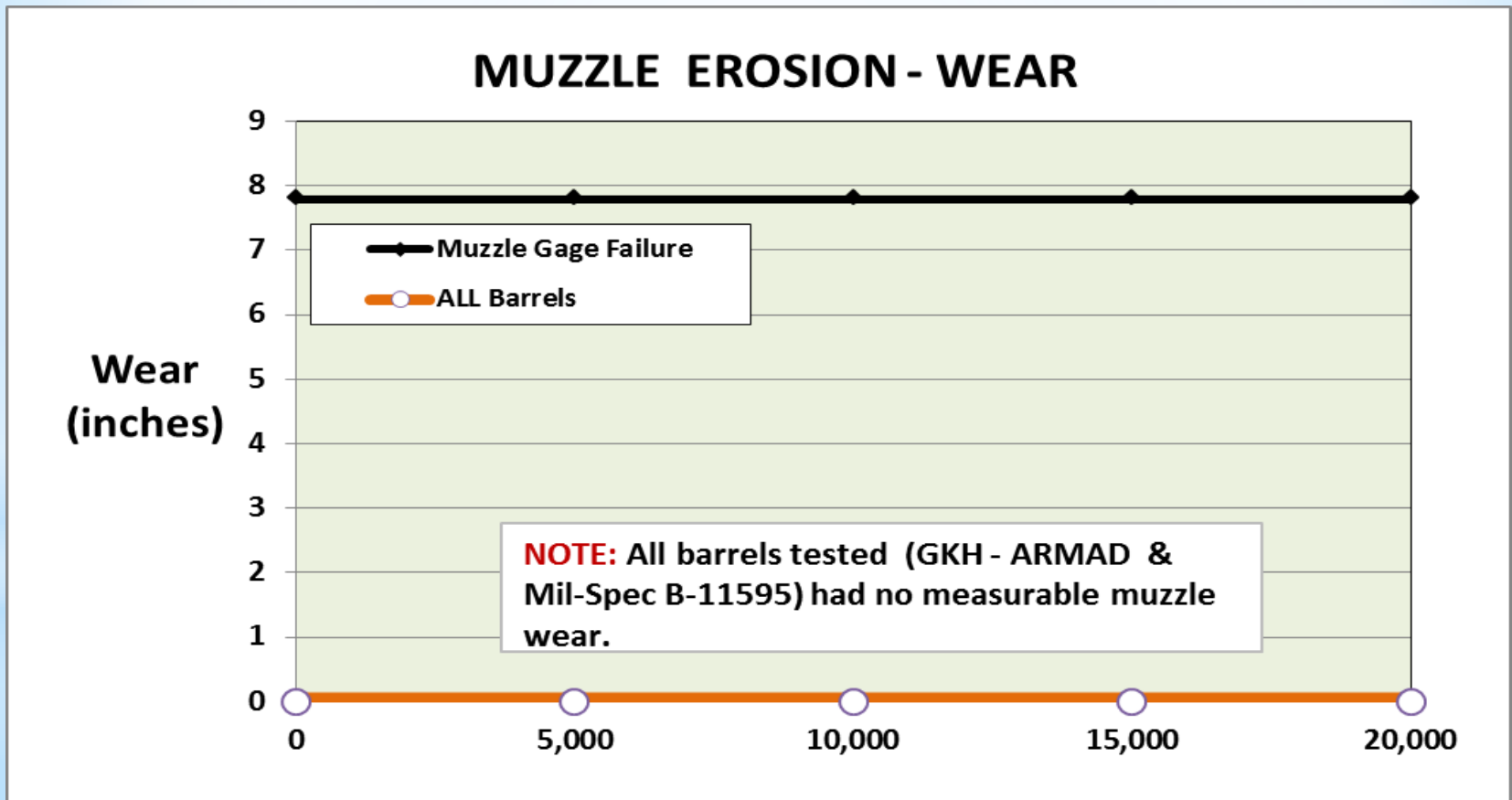


**THROAT
EROSION
GAGE P/N
11816276**

**BORE
EROSION
GAGE P/N
11816298**

**MUZZLE
EROSION
GAGE P/N
11816276**

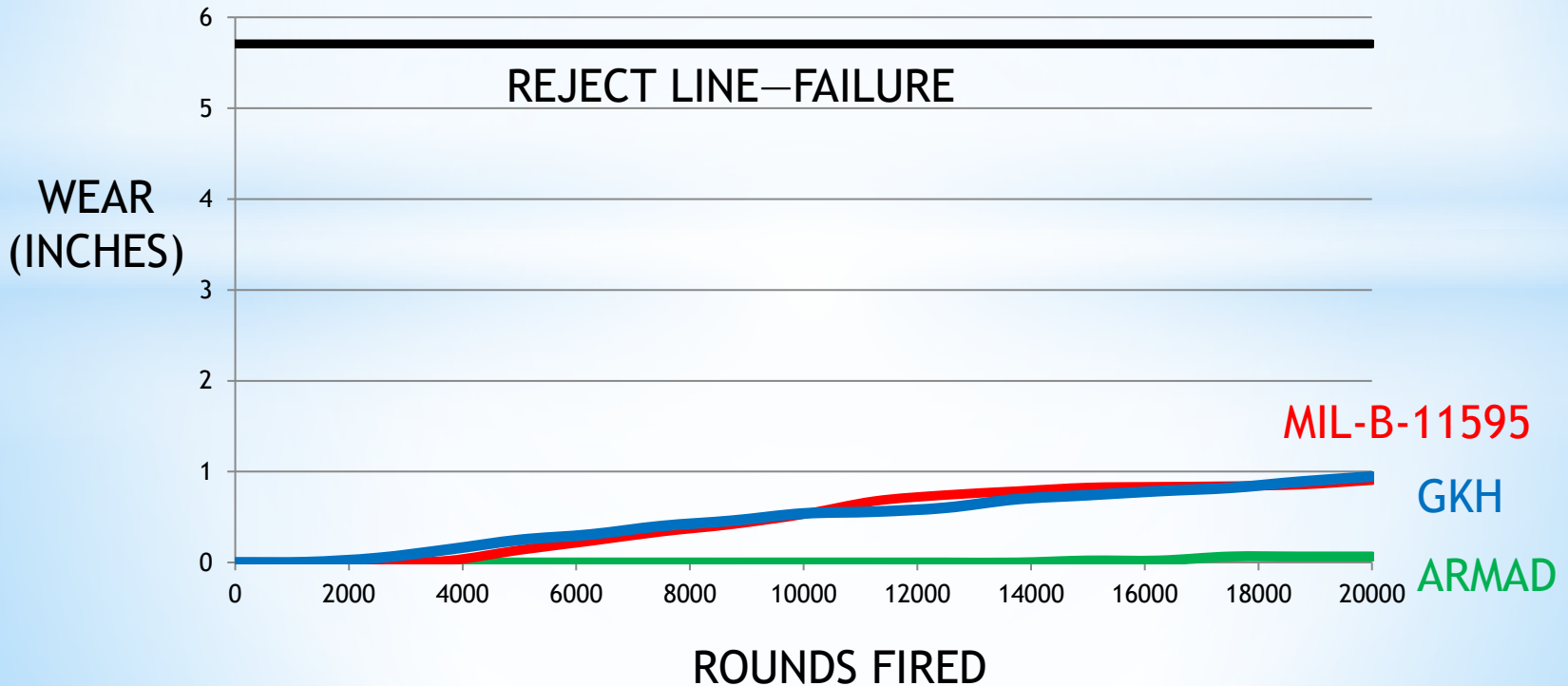
MUZZLE WEAR





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THROAT WEAR

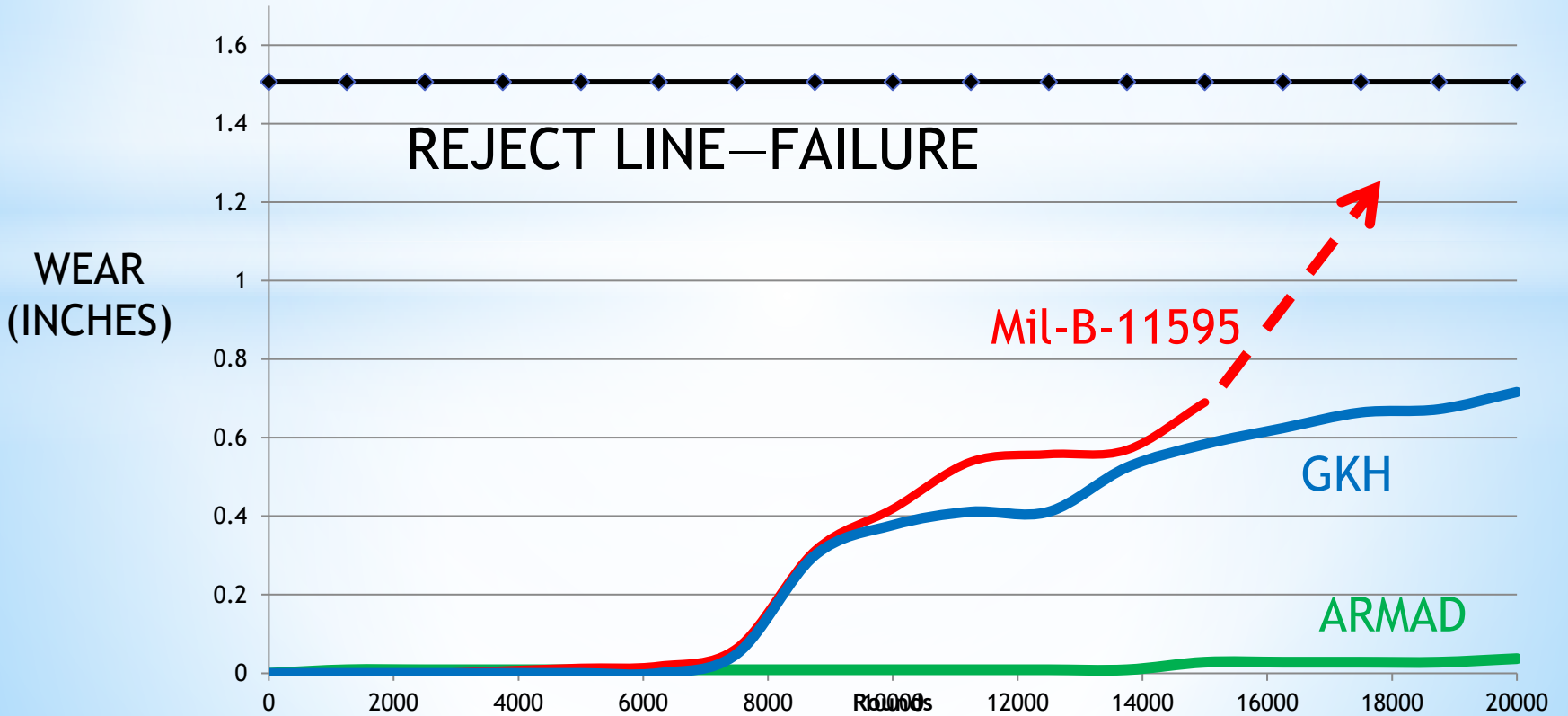


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BREECH WEAR



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MIL-DTL-6331 CRITERIA

AT 15K ROUNDS:

ALL BARRELS WITHIN SPEC

 YAW— 10% $>15^\circ$ MIL-B-11595

AT 20K ROUNDS:

ARMAD and GKH WITHIN SPEC

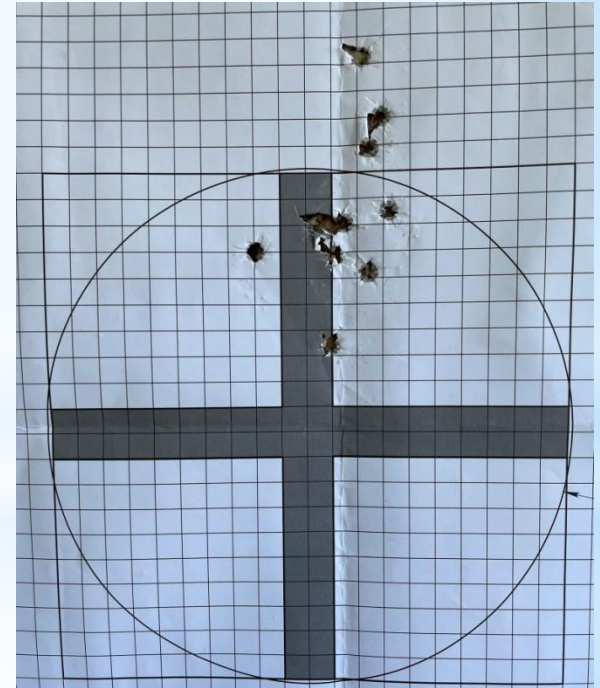
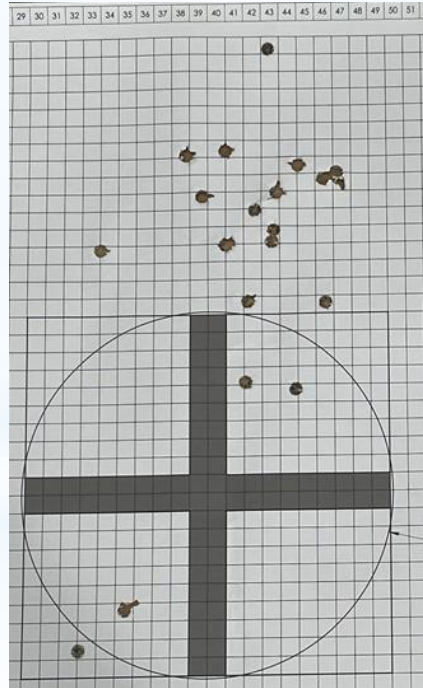
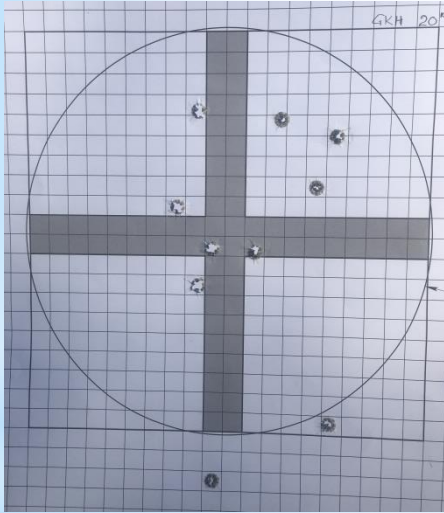
YAW— 20% $>15^\circ$ MIL-B-11595—**FAILURE**



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GKH-20K

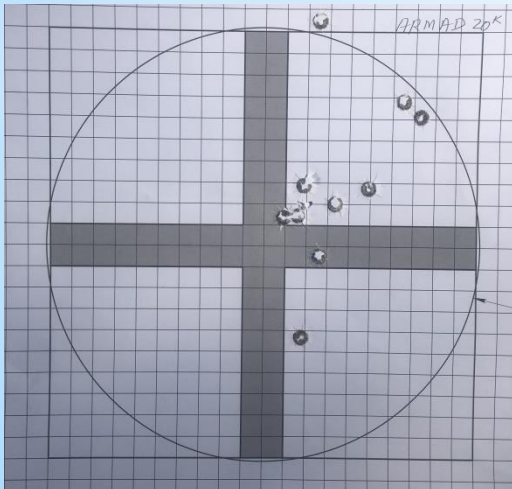
TARGETS



15K

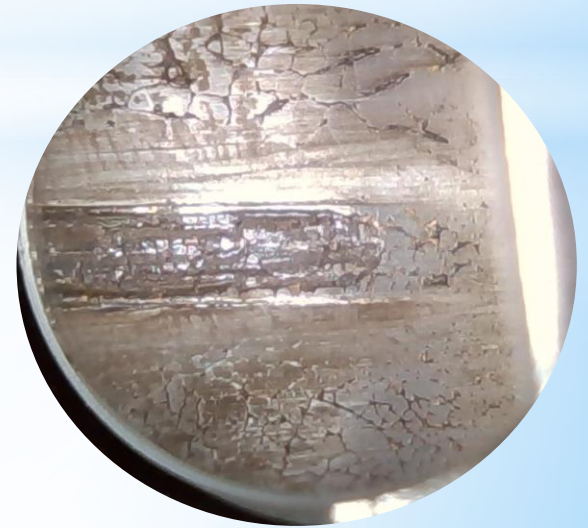
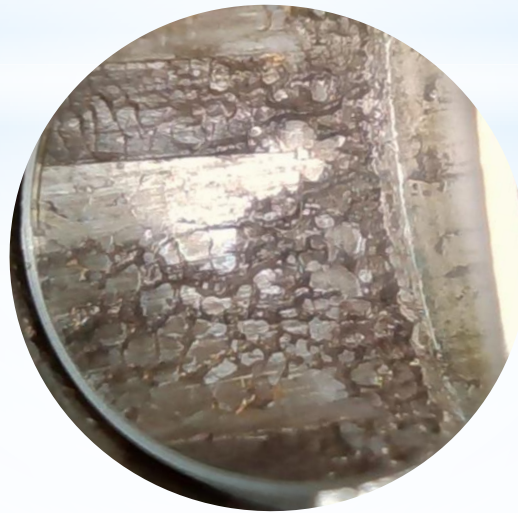
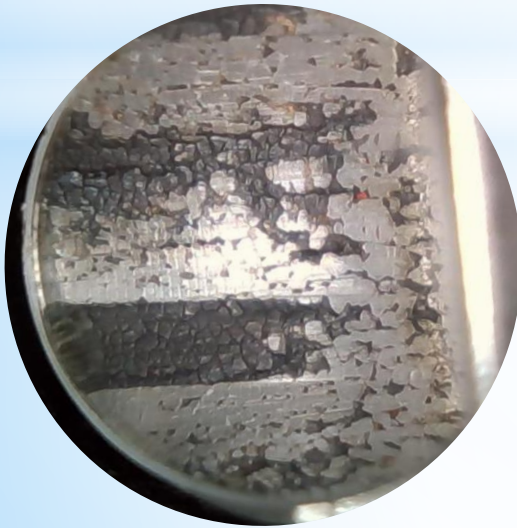
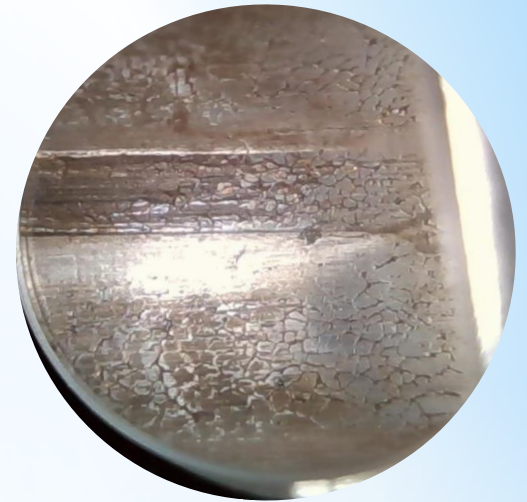
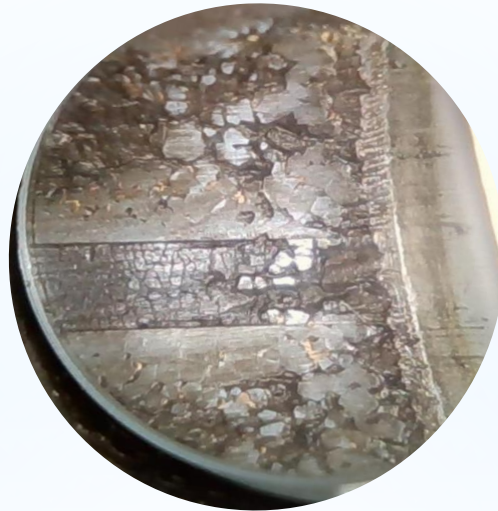
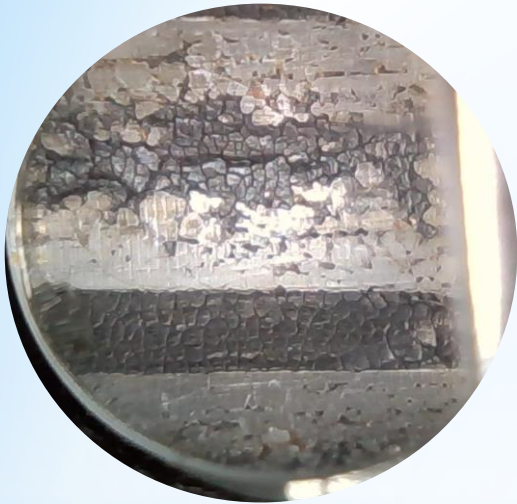
MIL-B-11595

20K



ARMAD-20K

THROAT



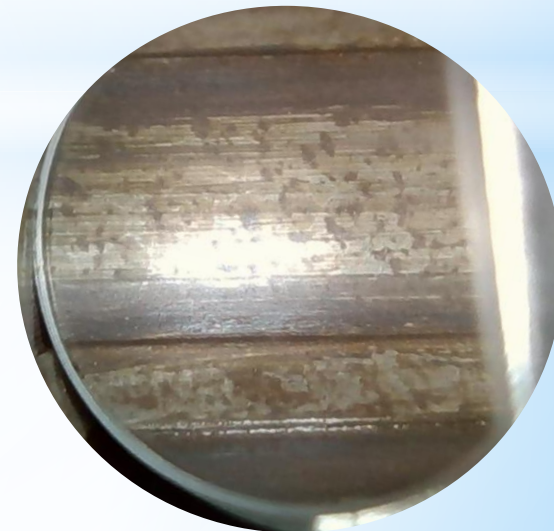
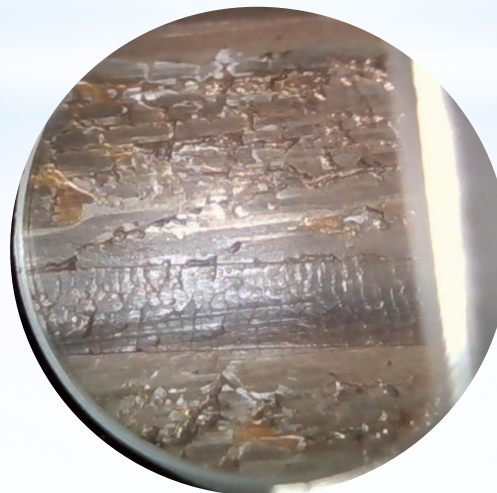
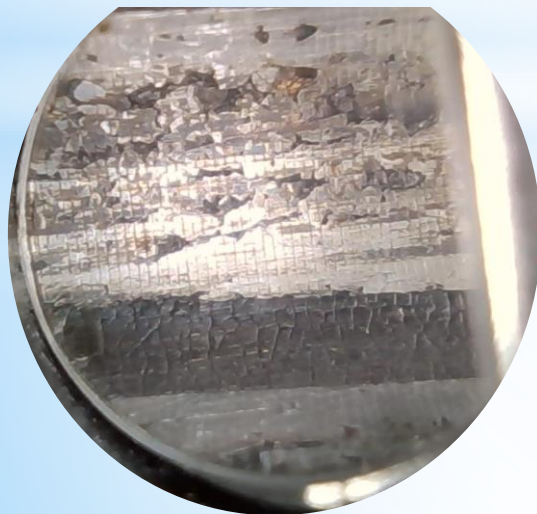
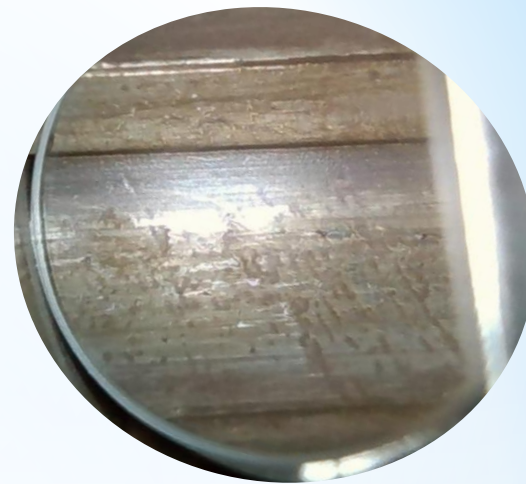
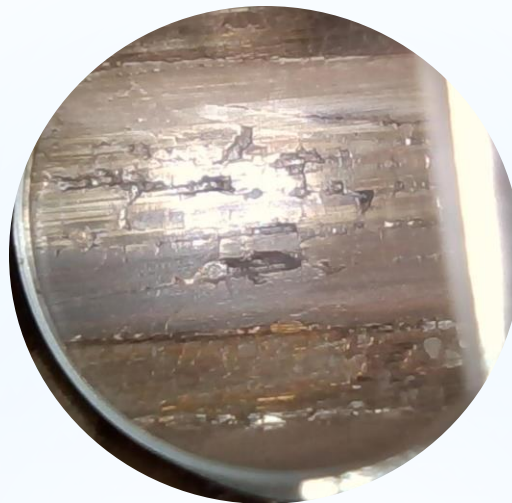
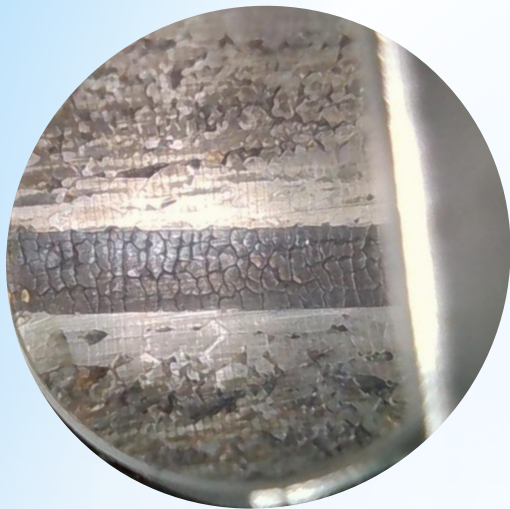
Mil-B-11595

GKH

ARMAD

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THROAT + 25mm

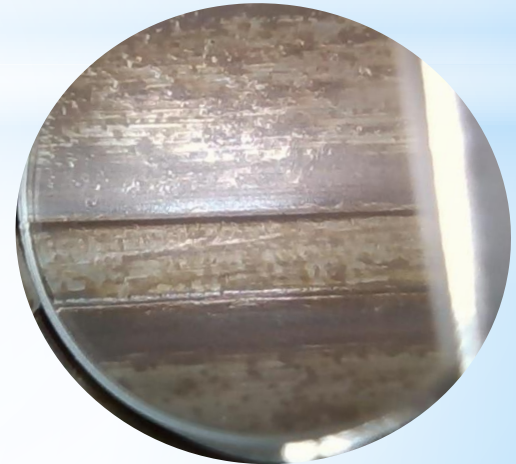
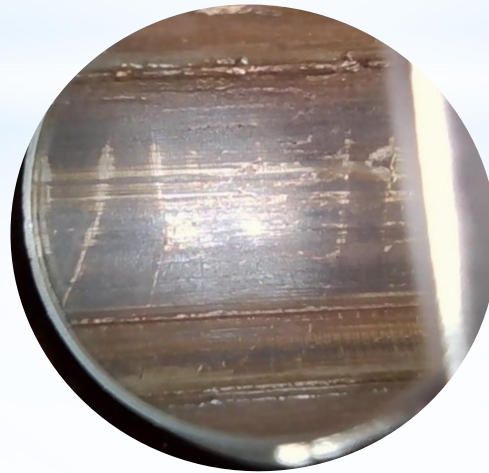
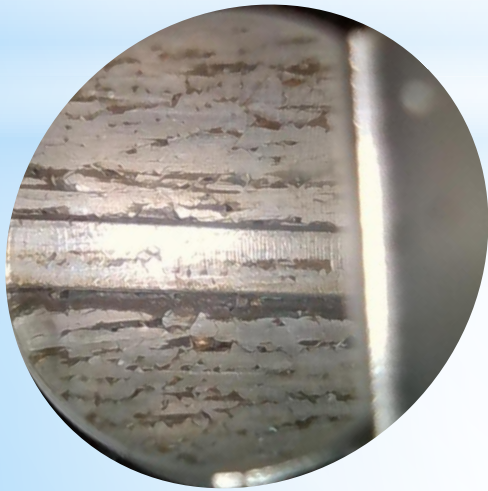
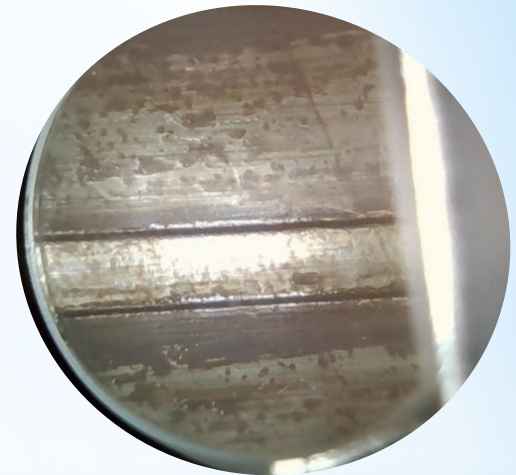
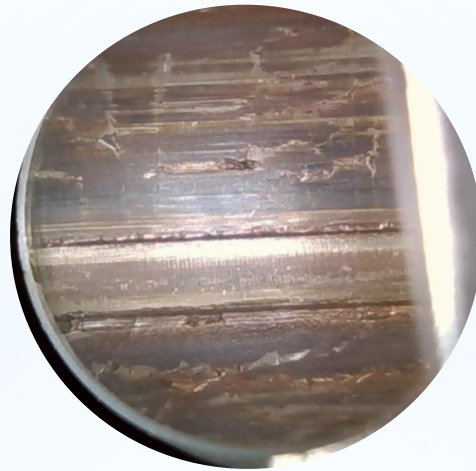
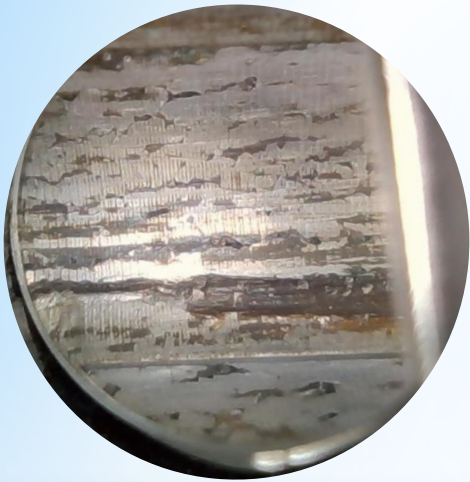


Mil-B-11595

GKH

ARMAD

THROAT + 50 mm



Mil-B-11595

GKH

ARMAD



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CONCLUSIONS

- 1. ARMAD GIVES SUBSTANTIAL INCREASE IN BARREL LIFE**
- 2. BARREL MANUFACTURE ROCKWELL C—40'S BY BUTTON, CUT**
- 3. AMEND MIL SPEC TO INCLUDE BETTER MATERIALS**
- 4. BORE GAGES NOT PRACTICAL FOR FIELD BARREL LIFE DETERMINATION**



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CREDITS



- OHIO ORDNANCE WORKS
- US NAVY
- FCIP



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BORE CONDITIONS



Chamber pressure 50,000-60,000 psi.

Projectile velocity 3,000 f/s

Gas velocity 4100 f/s

Gases: H_2S , NH_3 , Methane

H_2O , CO_2 , CO

Gas Temperature: 3000 °-4600°F



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October 1948

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FURTHER STUDY

- **ACCURATE BORE MEASUREMENTS—BEMIS**
- **ADDITIONAL TESTING—ARMAD & GKH**
- **BARREL LIFE WITH TRACERS INCLUDED**
- **HOT FIRING SCHEDULE**
- **NITRIDED vs CHROME vs UNCHROMED**
- **NEXT GENERATION ARMAD**



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QUESTIONS?

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**Gun IQ International: Providing
engineering, testing and marketing
services to the firearms industry since 1948**



**Damascus barrel
Study --1955**

