



OVER 45 YEARS OF PERFORMANCE DESIGNED SOLUTIONS

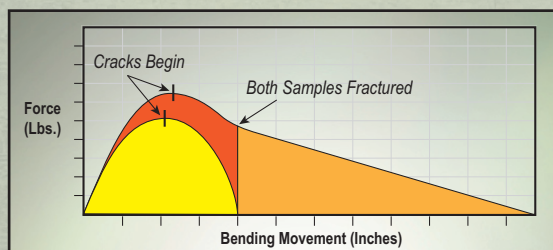
UNI-TUFF RF SERIES

High Steel Fiber Castables

Need: Maximum Resistance to Mechanical Abuse and Cracking due to Thermal Cycling

Measurement: **Traditional Methods** Tests such as CCS and MOR **do not** accurately measure resistance to mechanical abuse, cracking or extreme thermal shock

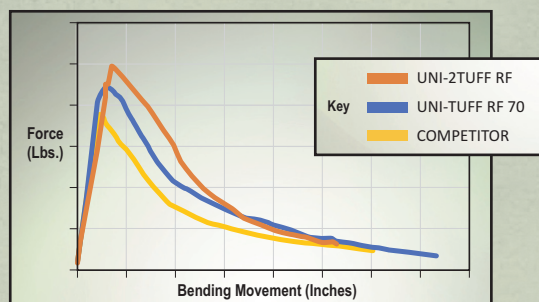
Work of Fracture (WOF) A 3-point load test conducted at 2000°F that quantifies the **amount of work** to fracture, propagate and separate a sample... especially effective with steel fiber reinforced monoliths



Standard vs Fiber Reinforced

Standard Sample	Work or Energy Required to Crack, Fracture and Separate (Work of Fracture)
Fiber Sample	Additional Work Necessary to Crack and Fracture Fiber Reinforced Sample (Extra Crack Resistance)
Fiber Sample	Additional Work Necessary to Separate Fiber Reinforced Sample (Extra Holding Power)

Results: WOF @ 2000°F



UNI-TUFF RF-70

High Steel Fiber Castables with RF (Rapid Fire) Technology

- Required Oxid. Resistance to 2200°F
- Mix Chassis Maximizes Fiber Knitting
- Excellent Resistance to Crack Propagation and Mechanical Abuse

UNI-2TUFF RF-70

- Superior Oxid. Resistance to 2400°F
- Proprietary Fiber Shape/Aspect Ratio
- Mix Chassis Maximizes Fiber Knitting
- Superior Resistance to Crack Propagation and Mechanical Abuse

UNI-TUFF RF Series Requires More Work at Temp. to Crack, Propagate and Separate.

Properties:

TEST	UNI-TUFF RF-70	UNI-2TUFF RF-70	Competitor
HMOR @ 1500°F (psi)	3650	3700	2462
C704 @ 1500°F (cc)	4.3	3.1	6.0
Prism spall shock test (cycles)	26	>30	19
Continuous Exposure (MAX temp°F)	2200	2400	2200

Summary:

- Crack Resistance:** In HOT WOF testing, UNI-TUFF RF-70 and UNI-2TUFF RF-70 **outperform** the leading competition by **20% and 30%** respectively in fracture toughness.
- Improved Matrix Technology:** The UNI-TUFF RF Series utilizes **proprietary matrix technology** to uniformly disperse the SS fiber addition.
- New SS Fiber Addition:** UNI-2TUFF RF-70 is fortified with a **unique SS fiber alloy** possessing an optimum aspect ratio and increased oxidation protection by 200°F.
- Precast Solutions:** Critical Aluminum super-structure applications, i.e. Jambs/Lintels, Door Surrounds and Heat Treat/Forge Furnaces that experience **mechanical abuse and thermal shock**.