INTRODUCING NAK55

KNOCK OUT THE COMPETITION

40 HRC Pre-Hardened

High Performance
High Precision
Mold Steel

PLASTIC MOLDS

RUBBER MOLDS

JIGS & FIXTURES

PRESS DIES

Features

- Machines 30 to 40 percent faster than P20
- Pre-hardened to 38-42 HRC
- Uniform microstructure & hardness (40 HRC between surface & interior)
- Never needs stress relieving
- Highly weldable, HAZ gets softer not harder (re-age harden to bring back to 40 HRC)
- EDM layer is easy to remove

DAIDO STEEL

NAK55 is distributed by
Lindquist Steels, Inc.
a Daido partner company

LINDQUIST STEELS, INC.
TOOL STEEL SPECIALISTS

Corporate Office: 1050 Woodend Rd.
Stratford, CT 06615
800-243-9637 Fax: 203-386-0132

1950 Old Dunbar Rd.
Columbia, SC 29172
800-845-7052 Fax: 803-794-6658

www.lindquiststeels.com

Chemical Composition

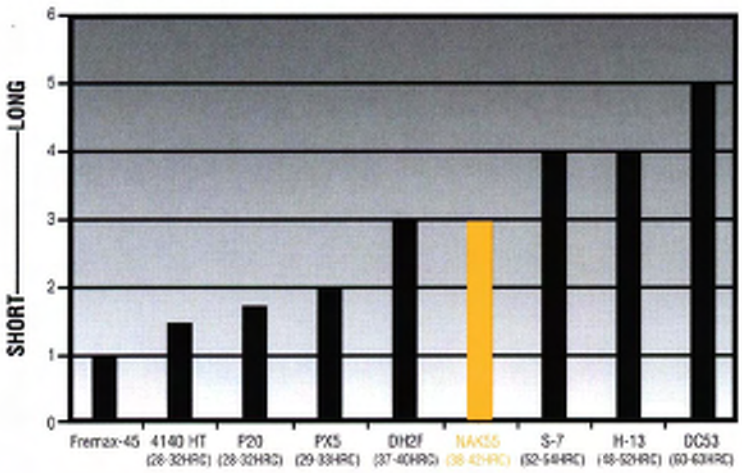
General Chemistry

Material	Hardness	Chemical Composition (%)							
		C	S	Mn	Si	Mo	Ni	Cu	AL
NAK 55	38-42 HRC	.15	.10	1.50	.30	.30	3.0	1.0	1.0

Quality Characteristics I

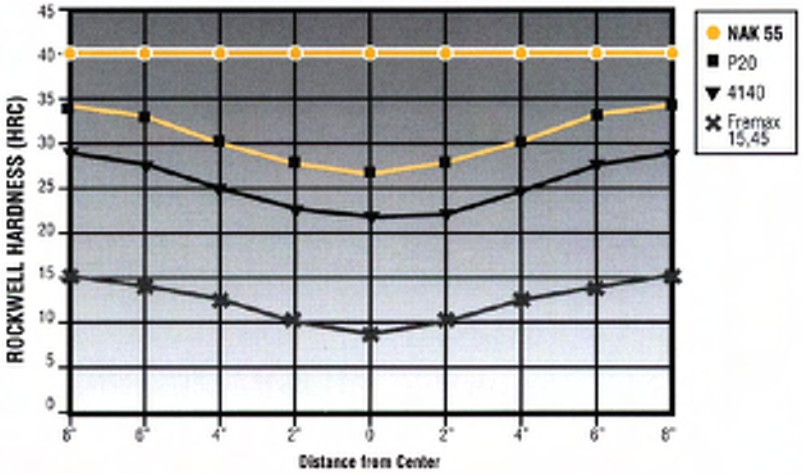
Materials / Mold Life

General purpose plastic molding material for mass production.



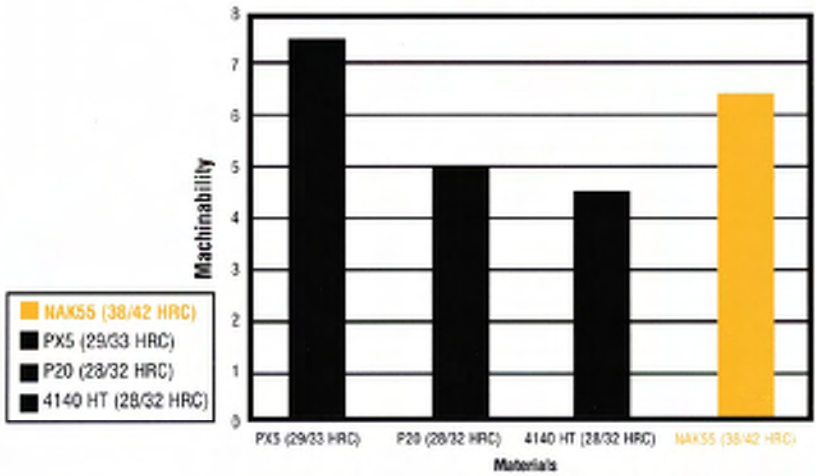
NAK55 Hardness Distribution

NAK55 shows uniform hardness distribution through to the center.



Quality Characteristics II

Machining Characteristics



Quality Characteristics III

• Mechanical Properties

Tensile Strength	**182,000 psi**
Yield Strength (.2% offset)	**146,500 psi**
Reduction of area	**39.8%**
Elongation in 2" (longitudinal)	**15.6%**
Modulus of elasticity (room temperature)	**30.0 x 10^{-6} psi**
Charpy V-notch Impact Strength:	
Longitudinal	7.2 ft./lb.
Transverse	5.6 ft./lb.
Hardness	40 HRc

• Physical Properties

Thermal Conductivity (W/m • ℃) (( ) cal/cm• sec•℃)

	20˚C	100˚C	200˚C	300˚C	400˚C
NAK 55	38.93 (0.093)	39.35 (0.094)	41.86 (0.100)	42.70 (0.102)	43.54 (0.104)
4140 HT	42.28 (0.1010)	41.61 (0.0994)	42.70 (0.1020)	39.39 (0.0941)	38.00 (0.0908)
P20		48.30 (0.1153)	41.50 (0.0991)	38.60 (0.0921)	38.10 (0.0910)

Coefficient of Thermal Expansion (x 10^{-6}/℃)

	20 ~ 100˚C	20 ~ 200˚C	20 ~ 300˚C	20 ~ 400˚C	20 ~ 600˚C
NAK 55	11.3	12.5	13.4	14.3	14.7
4140 HT	11.9	12.7	13.2	13.7	14.2
P20	11.9	12.3	12.7	12.8	13.7

Welding Guidelines

Welding of NAK 55 should be performed employing only NAK-W Welding Rods. NAK-W Welding Rods are copper-coated for either TIG or Heli-Arc welding. Employ only recognized, safe shop welding practices

❑ General

(1) The die or mold should be free of all oil, rust, scale residue or any other potential contaminates before attempting to weld.

(2) All cracks and surface treatments should be completely removed before attempting to weld.

(3) Sharp corners should be rounded to a minimum radius of .120"

(4) To repair a crack, remove sufficient stock to repair the crack and insure only sound material remains. Dress the corners where stock was removed to eliminate any square corners by rounding to a minimum radius of .120".

❑ Conditions

Rod Diameter	Electrode Diameter	Current/Amps
.047"	.047"	40~70
.0630"	.0630"	70~150
.0946"	.0946"	150~250

❑ Preheating

Prior to making a welding repair, preheat the piece to be repaired, by slowly heating in a furnace or with a gas burner to between **600° and 750°F**. Heating from the bottom is recommended if a gas burner is used. Uniform temperatures within the recommended range should be maintained during the entire period of time required to complete the repair. Ideally the entire mold should be heated in a furnace to achieve uniform temperatures. This is easy to do for small molds, but may not be practical or possible for large molds. Localized preheating is the only option for large molds, and attention must be paid to the following:

1) Preheating temperature must be achieved to at least 2" away in all directions from the area to be welded.

2) Use an Oxygen-Propane gas burner with a low flame temperature. Heat the mold carefully and gradually, maintaining a distance of 18" between the flame and the mold surface.

3) Apply a temperature choke or a surface contact thermometer to accurately measure the preheating temperature.

4) Re-heat as necessary during welding to maintain the above 600°F range.

❑ Post-Weld Heating

It is imperative that the following procedure be carefully followed to assure the welded section is completely restored to a uniform hardness:

The weld-repaired piece should be heated to between **860°—940°F** and held at this range for a minimum of one (1) hour to re-age. This re-aging process should be conducted immediately after welding. Heating with a furnace is highly recommended, however a gas burner may be used as a last resort. If a gas burner is used, heating from the bottom is recommended, however the entire welded area, and as much as 2" surrounding the weld, must be kept in the post heat temperature range for a minimum of one (1) hour. Cool slowly to room temperature.

Note: Post-weld heating should be performed after every 3 layers of weld buildup in order to alleviate welding stress and avoid over-aging of adjacent parent metal.

❑ Technique

- Use DC normal polarity.
- Use lowest possible amperage for the job.
- Use backhand welding — weld away.
- Use smallest diameter rod possible.
- Weld small beads.
- Peen weld as necessary.
- Upon completion of welding, proceed immediately to post-weld heating procedure.

1 - Old logo milled out

2 - Cavity pre-heated 600°-750°F
Welded with NAK weld rod
Post heated 950°F for 1 hour

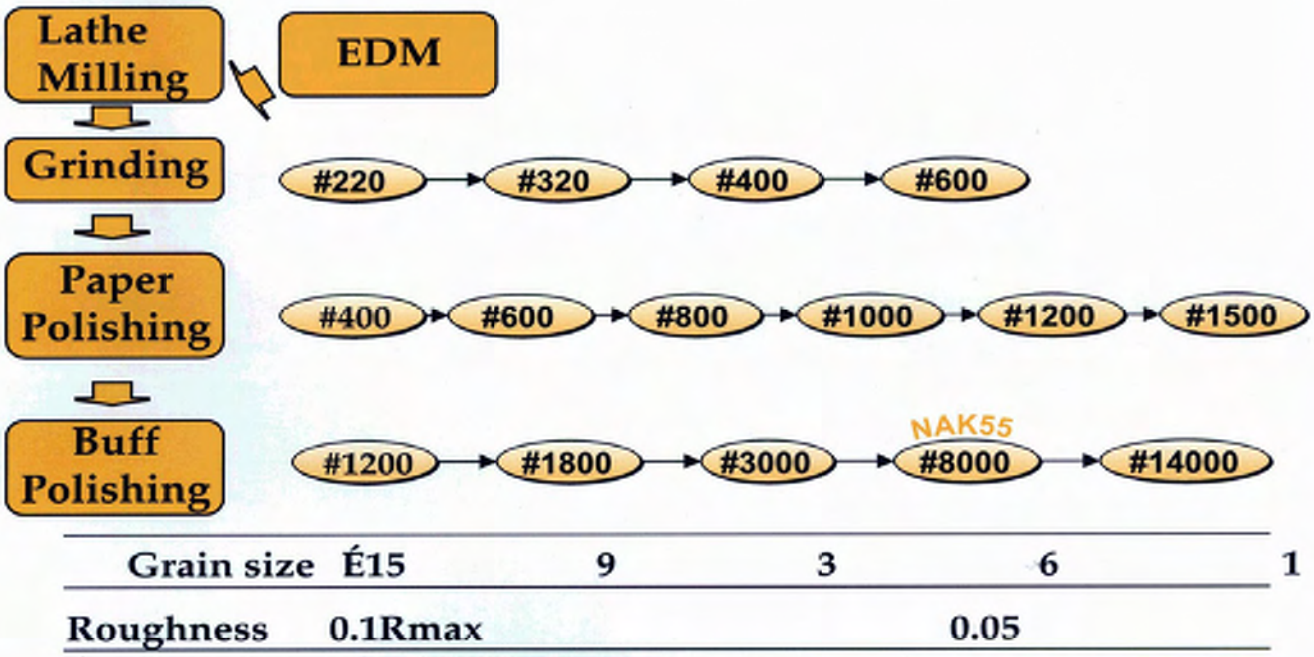
3 - Cavity and weld ground down

4 - Cavity face polished

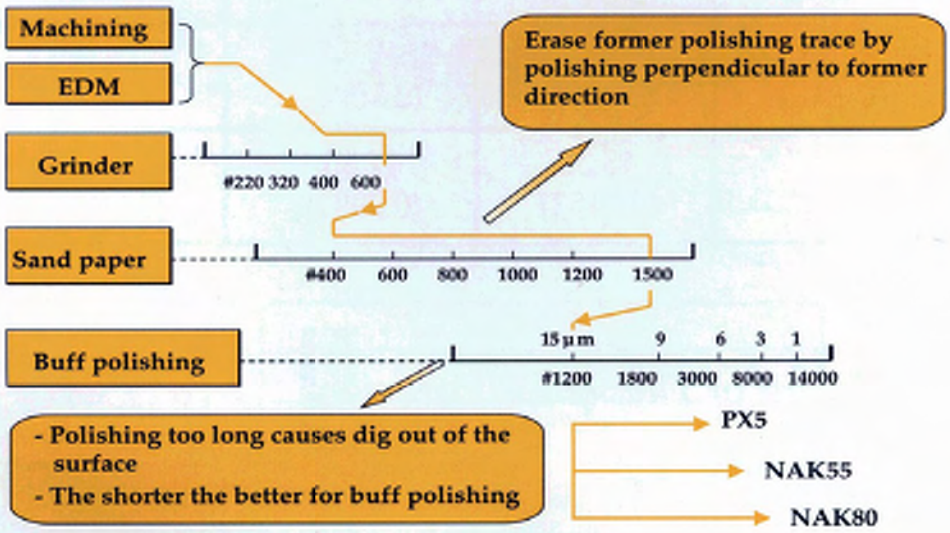
5 - Logo engraved over welded area

Polishing NAK55

Order of mirror finishing



Example of finishing order for each plastic mold steel



1050 Woodend Rd. • Stratford, CT 06615 • 800-243-9637 • www.lindquiststeels.com