

# Cole-Parmer®

## XP-400 X-Press®

Hydraulic Pellet Press for Spectroscopy Applications

### Accessory Manual

For 115V (04577-46) and 230V (04577-47)



For Product Information



## Table of Contents

INTRODUCTION .....	3
HOW TO USE DIE SET .....	3
USE OF SPEC-CAPS® (Optional) .....	4
ADDING SAMPLE TO DIE.....	4
PRESSING UNDER VACUUM (Optional) .....	4
REMOVING SAMPLE DISC FROM DIE.....	4
INSTRUCTIONAL GUIDE.....	5
EVACUABLE DIE SETS .....	6
DIE MAINTENANCE AND STORAGE .....	6
SLEEVE AND PLUNGER.....	7
INSTRUCTIONAL GUIDE.....	7
SLEEVE AND PLUNGER SETS.....	8
SPEC-CAPS® .....	8
EDGE FLARING TOOLS .....	9
REPLACEMENT PELLETS.....	9
BINDERS.....	10

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## INTRODUCTION

The components of the die set are carefully packed to avoid damage or corrosion during storage and shipment. The steel polished steel pellets are immersed in a rust-preventive oil and the other steel components have been lightly coated with the same oil. Before the die is assembled, the oil should be removed with isopropyl alcohol, and all parts wiped dry with a non-abrasive cleaning cloth.

The steel pellets must be handled and cleaned with extra care. Any damage to the polished faces will lead to an imperfect surface of the pressed sample discs. Traces of oil on these faces may cause the sample discs to adhere to the steel pellets.

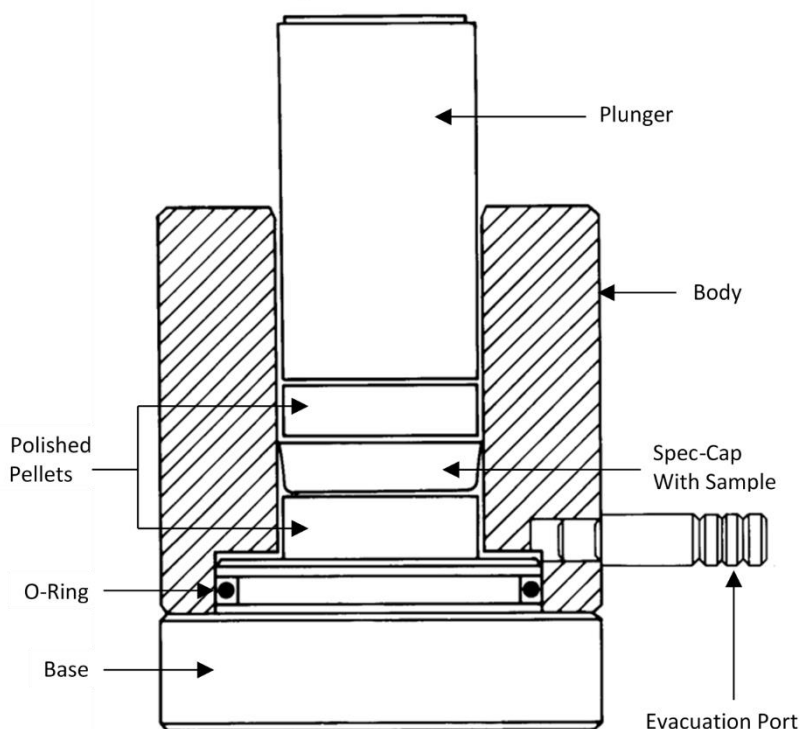


Figure 1: Assembled Die Set with Spec-Cap® (sold separately)

## HOW TO USE DIE SET

Place the die base on a flat surface or benchtop. Firmly push the die body onto the die base. The die base should fit snug in the recess of the die body.

With the die base and body assembled insert one steel pellet, polished side up, into the bore of the die. Do not force the pellet into the bore. It should fit precisely and slide down easily. Note, the pellet may sink slowly due to the resistance of trapped air. Do not touch the polished surface of the pellet, except when cleaning it, even skin oils or the touch of a rubber glove can affect the quality of the pressed sample disc.

## USE OF SPEC-CAPS® (Optional)

Spec-Caps® are thin-walled aluminum cups which reinforce, protect, and make handling or labeling of sample disc easier. When properly placed in the die, Spec-Caps® form the bottom and partial sides for the pressed disc. Spec-Caps are available for each Cole-Parmer Die (except for the 10 mm or 13 mm die sets).

The Spec-Caps® has a slightly smaller outer diameter and will fit loosely in the die bore. We strongly recommend flaring these Spec-Caps® for a proper fit; this may be accomplished with a Cole-Parmer Edge Flaring Tool.

If there is a gap between the lip of the Spec-Caps® and the bore of the die, sample material will fill this gap. When the sample disc is pressed, this extra material may jam the disc in the die bore, crumple the Spec-Caps® walls, or cause other damage.

## ADDING SAMPLE TO DIE

The powdered sample may now be poured into the bore of the die. The thickness of the pressed disc should be 5 mm (10 mm or 13 mm disc are usually thinner ~ 3 mm). The weight and/or volume of the sample may vary depending on material. Typical amounts are between 6 g and 10 g to achieve a 5 mm pressed disc in the 31, 35, or 40 mm die. If analyzing the pressed disc by XRF, refer to the manufacturer of the XRF analyzer for more information regarding a pressed disc thickness or *"infinite thickness"*.

After the sample is poured into the Die, lightly tamp the sample powder with the squared end of the plunger. Failure to level the sample powder can result in the upper steel pellet tilting and jamming when pressing. This may damage both steel pellets and the die bore.

Insert the upper steel pellet into the die bore, polished side down. Do not force the pellet into the bore and do not touch the polished surface.

Insert the die plunger, SQUARED END FIRST, into the bore. The die is now ready for pressing.

## PRESSING UNDER VACUUM (Optional)

Following the previous steps, place the small O-ring on the plunger before inserting it into the die bore. Properly placed, this O-ring settles into the bevel of the bore, and acts as the upper vacuum seal.

To evacuate the assembled die of gases or moisture, attach a 5/16 in. inside diameter vacuum hose to the die Evacuation Port. Generally, two minutes or more vacuum time is recommended. The vacuum line should be left on the die throughout the actual pressing of the sample disc. The time for a given sample must be determined by the analyst.

## REMOVING SAMPLE DISC FROM DIE

Removing the pressed disc from the die can be done by hand in some cases, but is usually done in the press, using the extractor cup (knock-out ring). All Cole-Parmer Dies are supplied with a knock-out ring.

## INSTRUCTIONAL GUIDE



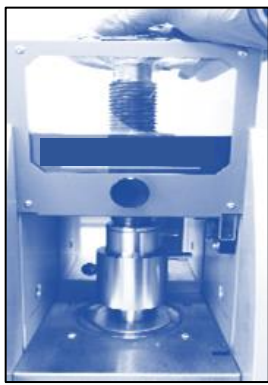
1. After run is complete, remove the die from the press and invert (turn upside down). Place on benchtop or flat surface.

**Tip:** Use one hand to hold plunger in die while turning the die upside down to prevent the plunger from falling out.



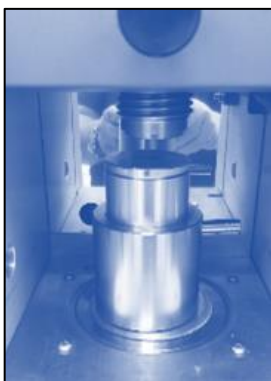
2. With the die inverted, remove the die base, as shown in picture. Place the knock-out ring on top (replacing base).

**Tip:** Use one hand to hold plunger when placing die assembly in press to prevent it from falling out.



3. Place the inverted die with knock-out ring atop in the press. Turn the screw handle, apply hand pressure to the assembly to extract the pressed sample disc.

**Tip:** Hold the die body with one hand while turning the screw handle with the other hand.



4. Continue turning the screw handle until the plunger is pushed upwards into the die, and the body is flush (flat) with the platen, as shown in the picture.
5. Remove the die assemble from the press and place on benchtop or flat surface.

**Tip:** Place one hand underneath the die to prevent plunger from falling out.



6. Remove the knock-out ring and gently lift off the bottom polished pellet, thus permitting the removal of the pressed sample disc.

## EVACUABLE DIE SETS

Cole-Parmer dies are designed to fit all Cole-Parmer presses, and they are equally compatible with other standard laboratory presses using stand-alone dies.



### 3613 (13 mm) Die Set

Load limit = 10 Tons (9.1 metric tons)

Includes evacuatable die body, base, plunger, two 13 mm polished steel pellets, O-ring vacuum seal, knock-out ring for sample disc extraction.



### 3623 (31 mm) Die Set

Load limit = 50 Tons (45.4 metric tons)

Includes evacuatable die body (#31670), base (#31669), plunger (#31666), two 31 mm polished steel pellets (#3623ST), O-ring vacuum seal (#51763), knock-out ring for sample disc extraction (#3623E).



### 3616 (35 mm) Die Set

Load limit = 50 Tons (45.4 metric tons)

Includes evacuatable die body (#36780), base (#31738), plunger (#36778), two 35 mm polished steel pellets (#3616ST), O-ring vacuum seal (#51766), knock-out ring for sample disc extraction (#3616E).



### 3614 (40 mm) Die Set

Load limit = 50 Tons (45.4 metric tons)

Includes evacuatable die body (#31739), base (#31738), plunger (#31736), large O-ring (#51770), two 40 mm polished steel pellets (#3614ST), O-ring vacuum seal (#51768), extraction cup for sample disc extraction (#3614E).

## DIE MAINTENANCE AND STORAGE

The die should be cleaned after each sample disc is pressed, to prevent both corrosion and cross sample contamination. Do not use abrasive cleaners or cleaning cloths.

The steel pellets are the most critical and vulnerable parts of the die. Avoid dropping or scratching them and ensure that the polished faces are free of any contaminants.

If the Die is to be stored for an extended period-of-time, it should be lightly oiled, or kept in a moisture free container. Any oil should be removed before the die is re-used.



## SLEEVE AND PLUNGER

The purpose of the die sleeve and plunger set is to produce an XRF sample disc with a thin layer of sample (1 - 3 g) backed by a binder (1 - 2 g). Such discs are sturdy, prevent damage to the die, and allow full analytical intensity from a small amount of sample. *Note: this technique does not use a Spec-Cap®.*

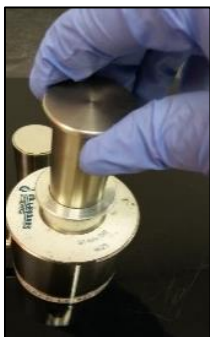
### INSTRUCTIONAL GUIDE



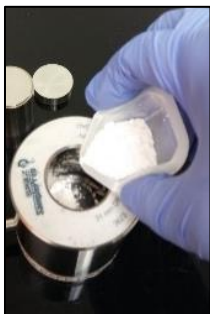
1. Assemble the die body and base. Insert one polished steel pellet into the die bore (polished side up). Gently insert the sleeve into the die body.



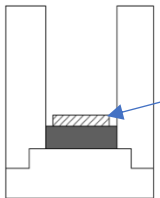
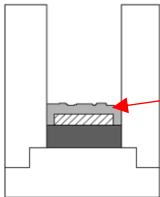
2. Weigh 1 to 3 g of sample and add to directly into the sleeve. Level the powder with a plastic spatula to evenly spread the sample on the bottom.  
**Note:** *hard to press materials may need 10% binder (by sample weight) to make a stable disc. An unstable disc could damage the XRF spectrometer.*

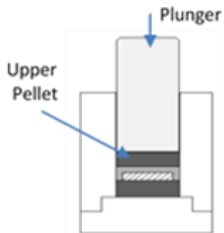


3. Slowly insert the plunger into the sleeve. Gently press, tap and rotate it to level the sample.  
**Tip:** *Hold the sleeve down with one hand while lightly pressing and rotating the plunger with the other hand.*
4. Slowly withdraw the plunger, to avoid disturbing the sample. Next withdraw the sleeve. This leaves the sample sitting on the steel pellet.






5. Weigh out 1 to 2 g of binder.  
**Note:** *the amount of binder only serves to make a solid bottom. It does not have to be accurate to the zero-decimal place.*  
**Tip:** *Add the binder in a circular motion to evenly spread on the bottom completely covering the sample.*


 <p>Sample after withdrawing sleeve and before adding binder</p>  <p>Binder</p>	<p>6. Level the binder without shaking or tapping the die.</p> <p><b>Tip:</b> Use a plastic spatula to evenly spread the top surface of the binder over the sample. Do not disturb the sample.</p>
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 <p>Upper Pellet</p> <p>Plunger</p>	<p>7. Insert the upper steel pellet, polished side down, into the die bore. Then insert the die plunger on top of the steel pellet. Place the assembled die in the press and set the desired protocol (tonnage, dwell, release).</p>
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## SLEEVE AND PLUNGER SETS

	<p><b>3623W (31 mm) Sleeve and Plunger</b></p> <p>Used with (#3623), 31 mm Evacuatable Pellet Die and Prep-Aid Sample Binder.</p>
	<p><b>3616W (35 mm) Sleeve and Plunger</b></p> <p>Used with (#3616), 35 mm Evacuatable Pellet Die and Prep-Aid Sample Binder.</p>
	<p><b>3614W (40 mm) Sleeve and Plunger</b></p> <p>Used with (#3614), 40 mm Evacuatable Pellet Die and Prep-Aid Sample Binder.</p>

## SPEC-CAPS®

	<p><b>3619 (30 mm) Spec-Cap</b></p> <p>The nominal outer diameter measures 30 mm wide x 8 mm deep, for (#3623) die. Produces pressed disc 31 mm x 5 mm. Outside painted to prevent seizure in die and to facilitate labeling. Recommend use of (#3618) Edge-Flaring tool. Sold in package of 100 and 1000 (#3619M).</p>
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	<p><b>3619A (31 mm) Pre-Flared Spec-Cap</b></p> <p>The nominal outer diameter measures 31 mm wide x 8 mm deep, for (#3623) die. Produces pressed disc 31 mm x 5 mm. The (#3619A) has been pre-flared for a snug fit in the (#3623) die, and has an unpainted surface. It may be substituted for the (#3619) 30 mm Spec-Cap in all applications where flaring is recommended. Eliminates need for (#3618) Edge-Flaring tool. Sold in package of 100 and 1000 (#3619AM).</p>
	<p><b>3615 (33 mm) Spec-Cap</b></p> <p>The nominal outer diameter measures 33 mm wide x 8 mm deep, for (#3616) die. Produces pressed disc 35 mm x 5 mm. Outside painted to prevent seizure in die and to facilitate labeling. Recommend for use with (#3625) Edge-Flaring tool. Sold in package of 100 and 1000 (#3615M).</p>
	<p><b>3617 (38 mm) Spec-Cap</b></p> <p>The nominal outer diameter measures 38 mm wide x 8 mm deep, for (#3614) die. Produces pressed disc 40 mm x 5 mm. Outside painted to prevent seizure in die and to facilitate labeling. Recommend use of (#3618) Edge-Flaring tool. Sold in package of 100 and 1000 (#3617M).</p>
<h2>EDGE FLARING TOOLS</h2>	
	<p><b>3618 Edge-Flaring Tool</b></p> <p>For (#3617 and #3619) Spec-Caps®. This tool widens the Spec-Caps® rim to ensure a tight fit against the inner wall of the die, thus preventing sample loss and pellet jamming.</p>
	<p><b>3625 Edge-Flaring Tool</b></p> <p>For (#3615) Spec-Caps®. This tool widens the Spec-Caps® rim to ensure a tight fit against the inner wall of the die, thus preventing sample loss and pellet jamming.</p>
<h2>REPLACEMENT PELLETS</h2>	
<p>If quantities of extremely hard materials are to be pressed, we recommend the use of the tungsten carbide pellets.</p>	
	<p><b>3613ST (13 mm) Steel Pellets</b></p> <p>For (#3613) die, sold in pairs.</p>
	<p><b>3623ST (31 mm) Steel Pellets</b></p> <p>For (#3623) die, sold in pairs.</p>

	<b>3623C (31 mm) Tungsten Carbide Pellets</b> For (#3623) die, sold in pairs.
	<b>3616ST (35 mm) Steel Pellets</b> For (#3616) die, sold in pairs.
	<b>3616C (35 mm) Tungsten Carbide Pellets</b> For (#3616) die, sold in pairs.
	<b>3614ST (40 mm) Steel Pellets</b> For (#3614) die, sold in pairs.
	<b>3614C (40 mm) Tungsten Carbide Pellets</b> For (#3614) die, sold in pairs.

## BINDERS

Binders are usually blended with the sample after pulverizing and before pressing a disc for XRF Analysis. Their use should lead to a stable, crumble-proof sample disc achieved with a minimum of dilution, and contamination.

	<b>3642-150 Prep-Aid Cellulose Binder</b> < 20 µm powder. Recommend blending with sample at 10 to 15% by weight. 150 g container. Cellulose powder.
	<b>3642-450 Prep-Aid Cellulose Binder</b> < 20 µm powder. Recommend blending with sample at 10 to 15% by weight. 450 g container. Cellulose powder.
	<b>3644-150 Prep-Aid UltraBind®</b> < 20 µm powder. Recommend blending with sample at 10 to 15% by weight. 150 g container. Proprietary blend.
	<b>3644-450 Prep-Aid UltraBind®</b> < 20 µm powder. Recommend blending with sample at 10 to 15% by weight. 450 g container. Proprietary blend.

	<p><b>3644T-500 UltraBind® Tablets</b></p> <p>Each tablet weighs 0.5 g. Recommend blending with sample at 10 to 15% by weight. 500 tablets per container. Proprietary blend</p>
	<p><b>3646-150 Prep-Aid Paraffin Binder</b></p> <p>&lt; 20 µm powder. Recommend blending with sample at 10 to 15% by weight. 150 g container. Paraffin wax.</p>
	<p><b>3646-450 Prep-Aid Paraffin Binder</b></p> <p>&lt; 20 µm powder. Recommend blending with sample at 10 to 15% by weight. 450 g container. Paraffin wax.</p>