

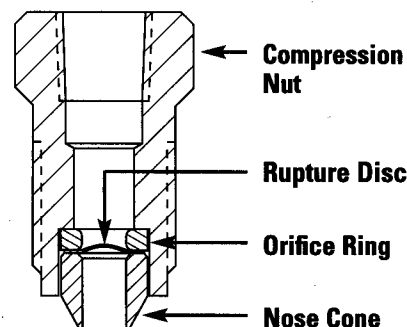
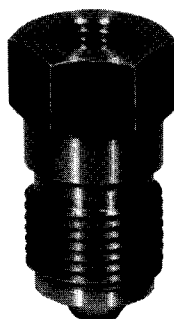


Parr Instrument Company

Operating Instruction Manual Safety Rupture Discs

Safety rupture discs are installed in Parr laboratory reactors and pressure vessels to protect the equipment and the operator from unexpected overpressure. These safety devices are made in several styles, each designed to match the size constraints and the relief flow requirements of the reactor or vessel on which it is used. Each assembly consists of a domed, frangible metal disc clamped firmly against a carefully machined orifice through which the disc will rupture and release pressure/material from the vessel if the internal pressure reaches a pre-determined burst range. All assemblies have either a safety tee or provision for attaching extension piping or tubing to carry any discharge to a safe outlet if the rupture disc should burst. The several different rupture disc assemblies used in Parr apparatus are illustrated with listings of the particular units in which each is installed.

The rupture disc installed in each Parr reactor or pressure vessel will function as an effective safety device when used as directed. However, rupture discs



are of such simple construction that the user will often take them for granted and will overlook the potential hazards which can arrive from: (a) improper disc selection, (b) improper installation, (c) improper maintenance and usage, and (d) from failure to provide adequate venting. It is essential, therefore, that the user of this equipment read and observe the following instructions.

GENERAL INSTRUCTIONS

- 1. Retain the disc identification tag.** When shipped from Parr, there is a metal tag connected to the rupture disc assembly on each reactor which identifies the burst rating at room temperature and the construction material for the disc installed in that particular safety head. A similar tag will be furnished with each replacement disc. This tag must remain with the apparatus at all times so that both present and future operators will be aware of the disc rating. When installing a replacement disc always attach the new tag to the apparatus.
- 2. Select the proper burst rating.** There is an important relationship which must be maintained between the expected maximum operating pressure and the ratings for the rupture disc and pressure gage installed on a pressure vessel. As a basic rule, the operating pressure should never exceed 70 percent of the range covered by the disc and the gage. Thus a reactor equipped with a 2000 psi rupture disc and a 0-2000 psi gage can be operated up to 1400 psig without modification. Identification numbers and maximum working pressures for all Parr rupture discs are listed in this manual. Note that in all

cases the maximum working pressure rating does not exceed 70 percent of the nominal burst rating for each individual disc. Where this 70 percent restriction presents a problem, specially designed discs are available on special order, as discussed below. In general, the 1000 psi discs are the lowest ratings offered. If lower relief pressures are desired or required, the user should install a spring-loaded relief valve on the vessel to serve as a primary relief device, leaving the 1000 psi rupture disc in the system as backup protection in case the mechanical relief valve does not function as intended.

For applications where the 70 percent restriction presents a problem, pre-scored discs which can be used to 90 percent of their ratings are available. Discs can also be furnished with a test certificate showing burst pressures at room and elevated temperatures. Custom discs made of other than standard materials can be provided within the limits of available materials and size restraints. A minimum of six discs is usually required for a special order.

- 3. Select a suitable disc material.** The disc must be made of a material which is compatible with the



GENERAL INSTRUCTIONS, CONTINUED

environment in which it is used. This is particularly important when a reactor is used for several different purposes. A disc that may have been satisfactory for an original application may not be suitable in a different situation. The Inconel disc usually installed in Parr pressure equipment will resist most chemical vapors, yet it cannot be assumed that an Inconel disc will be suitable for all applications. Strong mineral acids, strong organic acids and wet halogens will attack Inconel to varying degrees. If corrosion becomes a problem, additional protection can be secured by placing a thin gold disc against an Inconel disc to protect the Inconel from corrosive vapors. Most discs for a 1/4-inch orifice can be protected in this manner. Two-piece, Inconel/gold discs are listed under part numbers 581HC—. Gold facing is not offered for the larger 1/2-inch diameter discs. Instead, 1/2-inch (708HCP—) discs are available in Hastelloy C-276 and tantalum. Hastelloy C-276 and titanium discs can also be furnished in the 1/4-inch (526HC—) size on special order.

4. Allow for temperature effect. The bursting pressure for any metal rupture disc will drop as the temperature is raised, although Inconel discs are much more stable in this respect than most other disc materials. A Parr Inconel disc will still retain about 90 percent of its room temperature rating when heated to 350 degrees C, but discs made of other materials, such as stainless steel or aluminum, will have entirely different temperature-pressure profiles, usually losing strength much more rapidly at elevated temperatures. Questions concerning the effect of temperatures on the burst rating of any particular disc should be addressed to Parr.

5. Be alert to damage from over pressure. Under normal operating conditions where the pressure applied to a disc never exceeds 70 percent of the burst rating there should be little or no deterioration in the ability of the disc to function as intended, unless it is affected by corrosion or other external factors. But if the operating pressure should ever exceed 70 percent, the disc may be weakened. And if the pressure should ever reach 90 percent of the disc rating, the disc should be replaced immediately as it is most likely that fatigue will have occurred and in subsequent operating cycles the disc may burst at a pressure below its original rating.

6. Provide safe venting. The user must assume full responsibility for installing an adequate and safe venting system to remove any toxic, flammable or volatile materials which would be released if the rupture disc should burst. Consideration must also be given to any flying particles, disc fragments or

reaction materials which might be carried with the discharge. The discharge port from the rupture disc must always be directed away from all operating personnel and preferably, **extension piping should be attached to the safety head to carry any discharge to a fume hood or to any other area where vapors can be released safely.** Connectors are provided on the A525HC and A888HC2 rupture disc assemblies for attaching 3/8" OD tubing to carry any discharge to a safe outlet. Be sure to anchor the discharge end of the extension tubing securely. The A707HC2 and A1417HC rupture disc assemblies installed on one gallon and larger reactors have straight discharge with a 1/2" NPT male pipe thread to which extension tubing can be attached. Any extension piping attached to this assembly must be anchored securely, as mentioned above.

7. Protect against loud noise. When a rupture disc bursts the instantaneous expulsion of gases and vapors at sonic velocities creates a loud noise which may damage the hearing of any operator or bystander who may be in the vicinity of the apparatus. Extension tubing will minimize this report, but individual ear protectors may be the only effective way to fully protect individuals from this hazard. Because of this potential hazard it is always best to operate a pressure reactor in an isolated area and to keep all unnecessary personnel away from the equipment while it is under pressure.

8. Install replacement discs carefully. When replacing a rupture disc, the domed side of the disc must project toward the outlet or discharge end of the assembly. If there is a choice between a sharp edge and a rounded edge on the orifice ring which bears against the domed side of the disc, place the rounded edge - not the sharp edge - against the disc. Apply a light coating of a thread lubricant (such as Parr 424HC2 anti-seize lube) to the surface of the orifice ring which contacts the body plug, and to the faces of the orifice cone which seals the assembly into the pressure vessel or fitting. The installation will be easier if you invert the assembly and the head before screwing the parts into place and tightening the body plug.

Part Number	Torque
A525HC*	30-35 ft-lbs
A888HC2*	30-35 ft-lbs
A707HC2*	45 ft-lbs
A1417HC	80 ft-lbs (4000)
A1417HC	100 ft-lbs (5000)

(*) Tighten Hastelloy C276 discs to 50-55 ft-lbs



PARR RUPTURE DISC SERIES

Disc No.	Burst Rating psig	Max. Working pressure, psig
SERIES 526HC: DISCS for 1/4" ORIFICE		
526HCB347-T	347 bar	243 bar
526HCP11AD	1150	800
526HCP14CH	1365	950
526HCP14CT	1400	980
526HCP20CH	2000	1400
526HCP30CH	3000	2100
526HCP40CT	4000	2800
526HCP6YA	600	420
526HCPD	1000	700
526HCPF	2000	1400
526HCPG	3000	2100
526HCPH	5000	3500
526HCPH-T	5000	3500
526HCPJ	8000	5600
526HCPL	12000	8400

SERIES 526HC: DISCS for 1/4" ORIFICE SCORED		
526HCB204YD-T	204 bar	143 bar
526HCB347YD-T	347 bar	243 bar
526HCP33YD	3300	2300
526HCP35YD	3500	2450
526HCP50YD-T	5000	3500

Disc No.	Burst Rating psig	Max. Working pressure, psig
SERIES 581HCP: GOLD-FACED ICONEL DISCS for 1/4" ORIFICE*		
581HCP14CT	1400	980
581HCP40CT	4000	2800
581HCPD	1000	700
581HCPF	2000	1400
581HCPG	3000	2100
581HCPH	5000	3500
581HCPJ	8000	5600

* Each gold-faced Iconel disc consists of two pieces: one gold, one Iconel.

SERIES 708HCP: DISCS for 1/2" ORIFICE		
708HCP10CH	1000	700
708HCP10CR	1000	700
708HCP10CT	1000	700
708HCP15CT	1500	1050
708HCP16CT	1600	1120
708HCP20CH	2000	1400
708HCP20CR	2000	1400
708HCP20CT	2000	1400
708HCP30CT	3000	2100

SERIES 1415HCP: DISCS for 1/2" ORIFICE		
1415HCP30CT	3000	2000
1415HCP45CT	4500	3000

SAFETY RUPTURE DISC ASSEMBLIES FOR PARR APARATUS

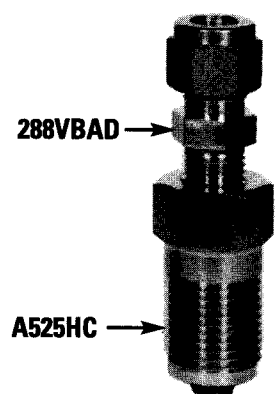
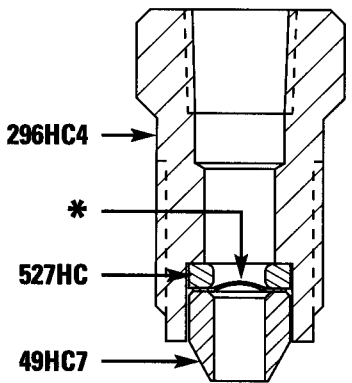
A525HC*

Orifice Diameter 0.25 inch, 1/2" NPS Thread

Use on Reactor Nos.

4521/23/31/33	1000mL
4522/24/32/34	2000mL
4544/45	600mL
4546/47/48	1200mL
4571/73/77	1000mL
4572/74/78	1800mL

* Use 526HC__ or 581HC__ series disc (see top of page)



◀ A525HC Rupture Disc Assby. shown with Extension for 3/8" OD Tube Conn.

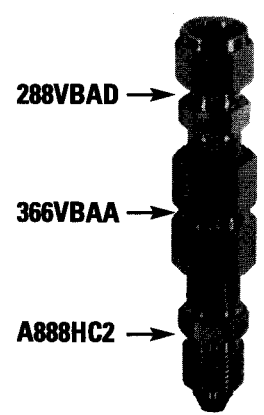
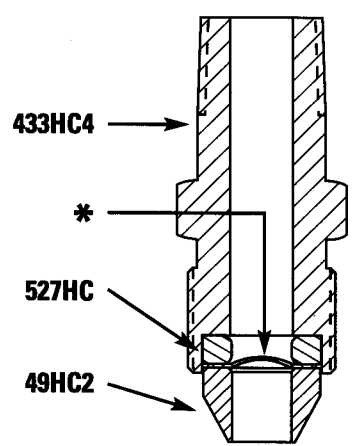
A888HC2*

Orifice Diameter 0.25 inch, 5/8"-18 Thread

Use on Reactor Nos.

4561/66	300mL	4591	25mL
4562/67	450mL	4592	50mL
4563/68	600mL	4593	100mL
4564/66B	160mL	5101	300mL
4565/66C	100mL	5102	450mL
4575	500mL	5103	600mL
4576	250mL		

* Use 526HC__ or 581HC__ series disc (see top of page)



◀ A888HC2 Rupture Disc Assby. shown with Extension for 3/8" OD Tube Conn.



SAFETY RUPTURE DISC ASSEMBLIES FOR PARR APARATUS

A707HC2*

Orifice Diameter 0.50 inch, 1/2" NPT Thread

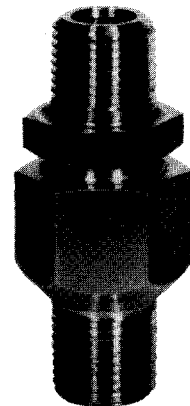
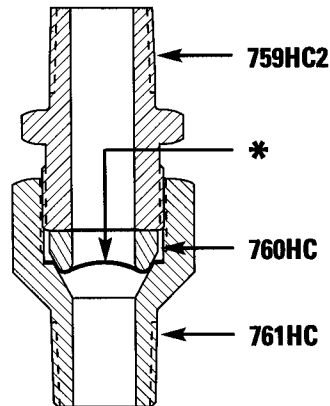
Use on Reactor Nos.

4551/4553	1 gallon
4552/4554	2 gallon
4555	5 gallon

Use on Cell Disruption Bombs

4637	1 gallon
4638	2 gallon

* Use 708HCP__ series rupture disc



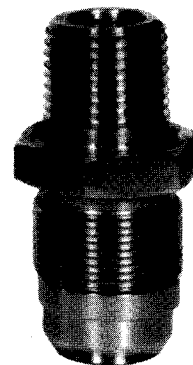
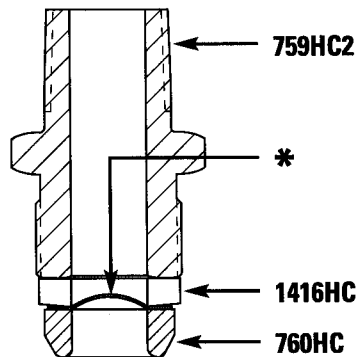
A1417HC*

Orifice Diameter 0.50 inch, 1"-20 Thread

Use on Reactor Nos.

4581/4583	1 gallon
4582/4584	1.5 gallon

* Use 1415HCP__ series rupture disc



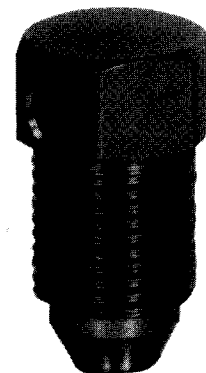
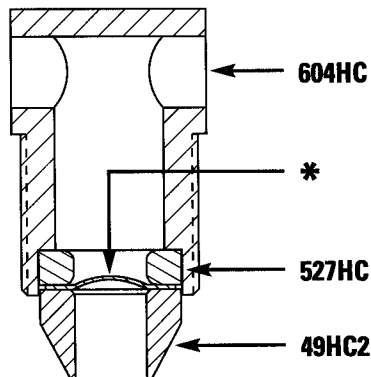
A888HC*

Orifice Diameter 0.25 inch, 5/8"-18 Thread

Use on Cell Disruption Bombs

4635	920 mL
4636	1850 mL

* Use 526HC__ series rupture disc



Parr Instrument Company

211 Fifty-Third Street
Moline, Illinois 61265 USA
309/762-7716 800/872-7720
Fax: 309/762-9453
www.parrinst.com
e-mail: parr@parrinst.com