

Inflatable Packer

Installation and Operation Manual



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DOCUMENTATION CONVENTIONS

This uses the following conventions to present information:



WARNING

An exclamation point icon indicates a **WARNING** of a situation or condition that could lead to personal injury or death. You should not proceed until you read and thoroughly understand the **WARNING** message.



CAUTION

A raised hand icon indicates **CAUTION** information that relates to a situation or condition that could lead to equipment malfunction or damage. You should not proceed until you read and thoroughly understand the **CAUTION** message.



NOTE

A note icon indicates **NOTE** information. Notes provide additional or supplementary information about an activity or concept.

Section 1: System Description

Function and Theory

The Geotech Inflatable Packer is a fixed-end style inflatable Packer used in 2 inch and 4 inch cased-well applications such as groundwater and landfill monitoring and sampling. Metal components are made from stainless steel and the Packer gland element is made of Viton® Fluoroelastomer, and is available in Neoprene and EPDM. The gland element is the key component that expands as air or water pressure is applied, and contracts as pressure is decreased. It expands evenly within the hole, which allows the outer material to protrude into well imbalances, thereby causing a tight seal over the full length of the Packer gland element.

The Geotech Inflatable Packer is available in two main model types. The 2 inch and 4 inch models are for use in 2 inch and 4 inch schedule 40 wells, respectively. Packers can be used in combination with electric or pneumatic pumps, above or below the Packer in the well to isolate zones within the well. The Packers have sealed metal tubing pass-thrus that can be used to attach pump discharge lines, electric pump power cables, pneumatic pump air lines or fittings for injection.

The top and bottom of most Packer models have inflation ports to allow concurrent use of multiple Packers in a stacked, or “straddle” configuration. A plug fitting can be used in the bottom inflation port to use the Packer in a single configuration.

Geotech offers either 1/4" or 3/16" outside diameter (OD) tubing for Packer inflation. Air or water can be used to inflate the Packer.



Figure 1-1: 4in Dual Feed Thru Packer

System Components

Each Geotech Inflatable Packer model is designed with different features in order to best suit different applications. The example below is the 4 inch Packer for the Geosub 2 with feed thru inflation and transducer feed thru.

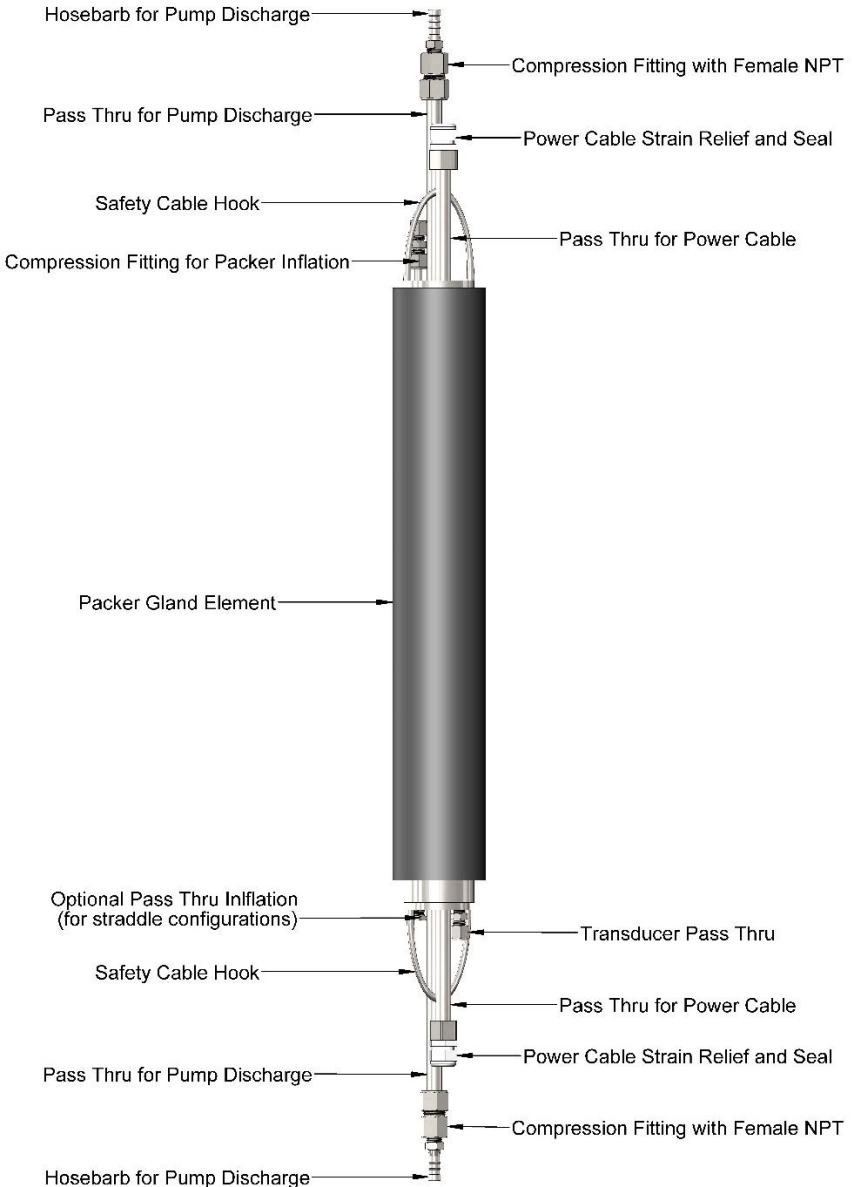


Figure 1-2: 4in Dual Feed Thru for Geosub 2 with Transducer

Section 2: System Installation



The Geotech Inflatable Packer should only be used in 2 inch and 4 inch schedule 40, cased wells. Installation and use in the incorrect well size or type can cause the gland element to over expand or burst.

Plug all ports that are not needed. For example, if the Packer model has a feed thru inflation port on the bottom, but the Packer is not being used in a straddle formation, this port should be plugged. Or, if the Packer is being used as the lower Packer in a straddle formation other unused feed thrus can be plugged.

Connect the inflation tube to the inflation compression fitting. Attach the safety cable to the safety cable hook. If using a pump, attach the necessary discharge tubing, air supply tubing, and vent line tubing. Feed any power cables through the power cable strain reliefs where needed. Feed any transducer cables through the transducer feed thru. Completely assemble all the needed tubing, power cables, and safety cables, then lower the Packer or Packer assembly in to the well and secure the top end of the safety cable.



The safety cable should be the primary weight-bearing method for lowering and raising the Packer. Ensure that the tubing length is always longer than the safety cable, especially between the Packer and a pump or between Packers in a straddle formation.



The 4 inch Packer models have a top and bottom. The top of the Packer is the open sided end. It is ok and expected that the open end side of the Packer will up with water if lowered below the water line.



Never fully inflate the Packer in an unconfined space. Doing so can cause the Packer to burst. See “System Operation” for the correct pressure to fully install and seat the Packer.

System Schematic

This example setup shows a 4in Packer with an Geosub 2 pump below and a Transducer between, all below the water line and connected to an air compressor. The power cable passes through the Packer to connect to the pump. The transducer also passes through the Packer. The inflation line, discharge line and safety cable connect to fittings or hardware at the top and bottom of the Packer.

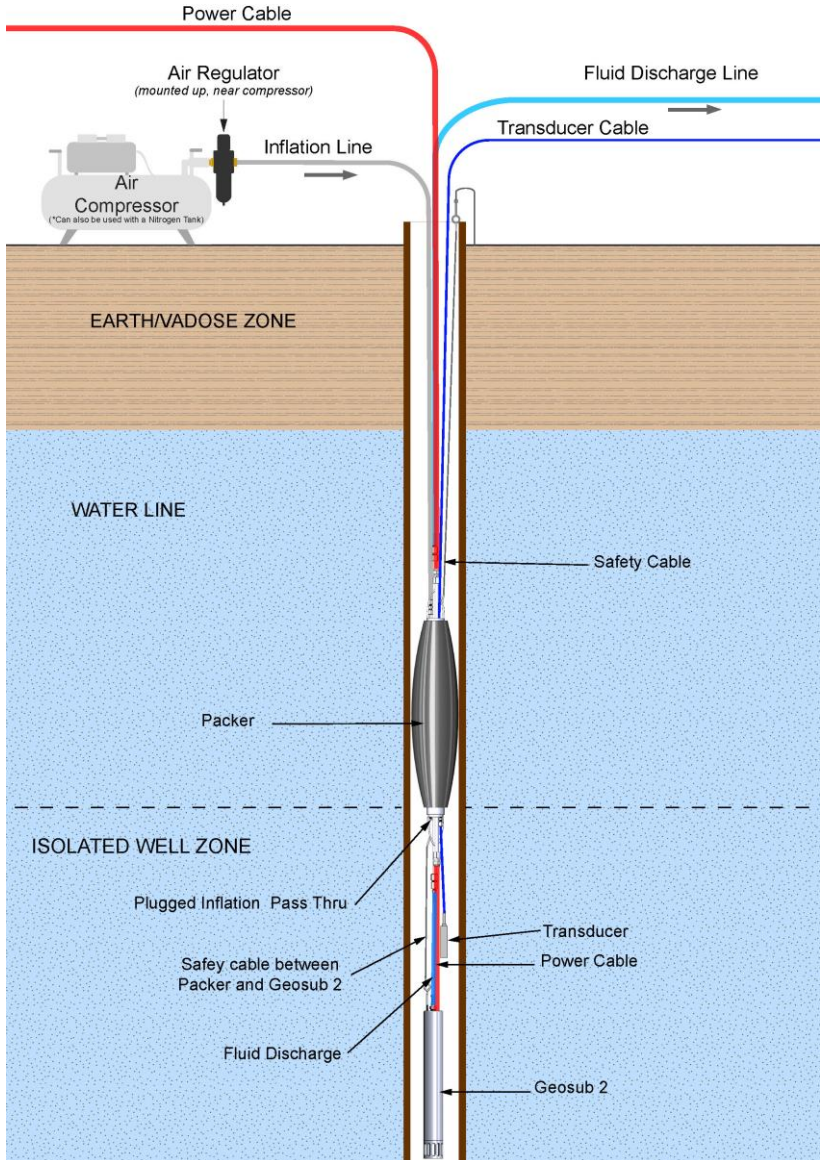


Figure 2-1: 4in Dual Feed Thru for Geosub 2 with Transducer

An example of a straddle Packer configuration is shown here. An inflation line and a safety cable is connected from upper to lower Packer.

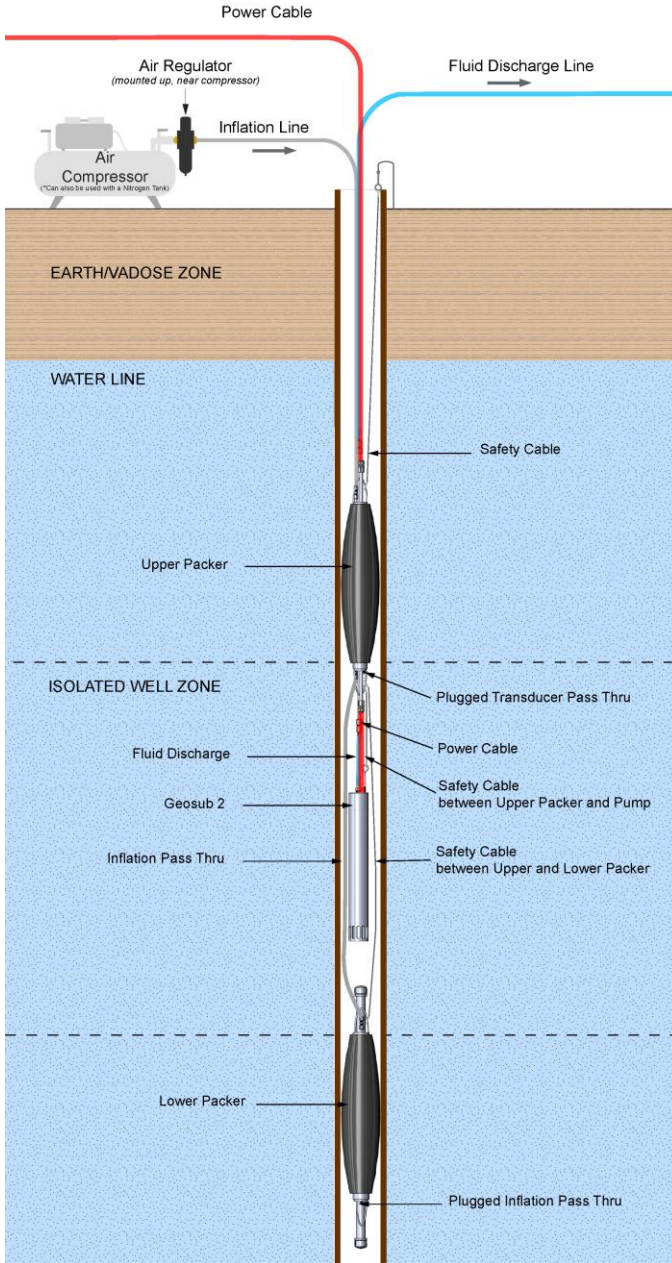


Figure 2-2: 4in Dual Feed Thru Upper Packer for Geosub 2 with Transducer in a straddle formation with a Single Feed Thru 4in lower Packer

Section 3: System Operation



Air or water can be used to inflate the Packer. The most common choices for inflation is nitrogen, compressed air or water. When using air inflation, nitrogen is recommended because it is the cleanest. Compressed air may be used, but it is recommended to filter it before inflating the Packer to prevent oil and dirt from getting inside the gland, which causes accelerated break down of the gland material.

Seat the Packer

After installation, connect the top end of the inflation line to the inflation source (air or water) with a gauge and regulator between the source and the Packer. Slowly and gradually increase the pressure to the Packer by adjusting the regulator. Slowly open the regulator to 25 PSI to inflate and seat the Packer, this is the starting pressure to seat the Packer. The operational pressure is discussed next.



The maximum pressure for all Geotech Inflatable Packers is 200 PSI. Do not exceed 200 PSI, doing so can cause the Packer to burst. See the “Calculating Operation Pressure” as a guideline to setting the Packer pressure.

Operating a Single or Straddle Packer

Use the formula in the next section to find the operational pressure. Once the Packer is seated, continue to slowly inflate the Packer to the operational pressure. The final gauge pressure should never exceed the total operational pressure, or 200 PSI, whichever is lower. Ensure to maintain operational pressure throughout any pumping, injection, measurement etc. deflation

When operating Packers in a straddle formation, attach the lower Packer to the upper Packer by attaching a safety cable from the top of lower Packer, to the bottom of the upper Packer. Use the Safety Cable Hook on the Packers as attachment points. To allow the lower Packer to be inflated, attach inflation tubing from the bottom of the upper Packer to the top of the lower Packer, using the inflation ports.



Ensure that the inflation tubing between Packers is longer than the safety cable used between the Packers so that the safety cable, not the inflation tubing, holds the weight of the lower Packer.

Removing the Packer

Be sure to stop all well operations (pumping, sampling etc) prior to removing the Packer. To remove the Packer, slowly decrease the pressure to zero to the Packer to deflate. It is important to allow ample time for the gland element to relax to its at-rest diameter before

removing. Complete deflation can be tested by inserting end of the inflation tubing in a cup of water. When there are no longer bubbles in the water, the element is deflated. You may now carefully retrieve the Packer or, if necessary, reposition it in the bore-hole.

Calculating Operational Pressure

To find the operational pressure follow these steps.

1. Seat the Packer.
2. Find the static head above water, the distance, in feet, and multiply by 0.43
3. Multiply the number in step two by 1.2
4. If the number found in step 3 is LESS than 25 PSI, inflate to 25 PSI. Otherwise, use the number found in step 3 for operations pressure, in PSI.

Example 1: The Packer is set to a depth of 100 feet and the water level is at the top of the well. If all the water is withdrawn below the Packer, the differential would be 43 PSI ($100 \times .43$). In step 3, the total is 52 PSI (43×1.2). The operational pressure is 52 PSI.

Example 2: The Packer is set to a depth of 50 feet and the water level is at a depth of 15 feet (35 feet above the Packer). If all the water is withdrawn below the Packer, the differential would be 15 PSI ($35 \times .43$). In step 3, the total is 18 PSI (15×1.2). Because this is less than 25 PSI, the operational pressure is 25 PSI.

Section 4: System Maintenance

Regularly inspect the gland element for cracking, wear, or breaks.

Regularly inspect fitting, tubing, and cables for kinks, cracks or breaks.

Cleaning Packers after use

With Inflation ports covered, pressure wash packer as soon as possible when removed from the hole.

Storing Packers to prolong life of the gland element:

Keep Packers in a cool, dry area when not in use.

Section 5: System Troubleshooting

Problem: Packer is not securing in well when inflated

Solution:

- Check air pressure from air source
- Ensure regulator is accurate and calibrated, faulty regulators are common causes of Packer failure
- Check air inflation ports: Inspect inflation tubing and fittings
- Inspect gland material for damage

Problem: Testing for leaks in Packer system

Solution: The safest way to test for leaks in the Packer system is to install a gauge between the regulator and the Packer and a valve between the regulator and the gauge. Seat the Packer then close the valve and monitor the gauge for any pressure drops. A pressure drop indicates a leak in the system.

Section 6: System Specifications

Physical Specifications		
	2 Inch Packer	4 Inch Packer
Diameter (uninflated)	1.9 inches	3.15 inches
Length (without fittings)	21 inches	36 inches
Gland Element Material	Viton® Fluoroelastomer (available in Neoprene and EPDM)	
Body/Fittings Material	Stainless Steel	
Max Air Pressure	200 PSI	
Exposed/Wetted Materials	316 and 304 Stainless Steel, Viton (or Neoprene or EPDM), PTFE tape (available without)	
pH Range	4-9	
Max Temperature	220°F	
	Inflation Line Size	
All 2in and 4in models	1/4" OD (3/16" available)	

Plug Fitting	
All 2in and 4in models	1/4" MNPT plug for inflation feed thru

	Hose Barbs	Cable Feed Thru
81401000	3/8"	Standard Geosub 2 cable
81401001	3/8"	Standard Geosub 2 cable
81401006	1/2"	Flat RF2 cable
81401007	1/2"	Flat RF2 cable
81401012	1/4" (discharge) 0.17" (air)	N/A
81401013	1/4" (discharge) 0.17" (air)	N/A
81401002	3/8"	Standard Geosub 2 cable
81401003	3/8"	
81401004	3/8"	Standard Geosub 2 cable
81401005	3/8"	
81401008	1/2"	Flat RF2 cable
81401009	1/2"	
81401010	1/2"	Flat RF2 cable
81401011	1/2"	
81401014	1/4" (discharge) 0.17" (air)	N/A
81401015	1/4" (discharge) 0.17" (air)	
81401016	1/4" (discharge) 0.17" (air)	N/A
81401017	1/4" (discharge) 0.17" (air)	
81401018	3/8" (air) 1/2" (vent) 3/4" discharge)	N/A
81401019	3/8" (air) 1/2" (vent) 3/4" discharge)	
81401020	3/8" (air) 1/2" (vent) 3/4" discharge)	N/A

81401021	3/4"	5/8" 12/3 AWG cable
81401022	3/4"	
81401023	3/4"	5/8" 12/3 AWG cable
81401024	3/4"	
81401027	N/A (1" MNPT)	(single 1" schedule 40 feed thru)
81401025	N/A (1" MNPT)	
81401026	N/A (1" MNPT)	(single 1" schedule 40 feed thru)

Section 7: Parts and Accessories

System Configurations

Geotech offers several models of pre-configured Packers that are specifically designed to be compatible with various pumps.

PART NUMBER DESCRIPTION

Packers for 2" Wells

GEOSUB 2

81401000	PACKER, DUAL, 2" ODX10L, GEOSUB
81401001 *	PACKER, DUAL, 2" X10" L, STRADDLE GEOSUB

RF2

81401006	PACKER, DUAL, 2" X10" L, RF2
81401007 *	PACKER, DUAL, 2" X10" L, STRADDLE RF2

1.66 BLADDER PUMP

81401012	PACKER, DUAL, 2" X10" L, 1.66BP
81401013 *	PACKER, DUAL, 2" X10" L, STRADDLE 1.66BP

Packers for 4" Wells

GEOSUB 2

81401002	PACKER, DUAL, 4" X20" L, GEOSUB
81401003	PACKER, DUAL, 4" X20" L, TRANSDUCER, GEOSUB
81401004 ***	PACKER, DUAL, 4" X20" L, STRADDLE GEOSUB
81401005 ***	PACKER, DUAL, 4" X20" L, TRANSDUCER STRADDLE GEOSUB

RF2

81401008	PACKER, DUAL, 4" X20" L, RF2
81401009	PACKER, DUAL, 4" X20" L, TRANSDUCER, RF2
81401010 ***	PACKER, DUAL, 4" X20" L, STRADDLE RF2
81401011 ***	PACKER, DUAL, 4" X20" L, TRANSDUCER, STRADDLE RF2

1.66 BLADDER PUMP

81401014	PACKER, DUAL, 4" X20" L, 1.66BP
81401015	PACKER, DUAL, 4" X20" L, TRANSDUCER, 1.66BP
81401016 ***	PACKER, DUAL, 4" X20" L, STRADDLE, 1.66BP
81401017 ***	PACKER, DUAL, 4" X20" L, TRANSDUCER STRADDLE, 1.66BP

AR4

81401018	PACKER, TRIPLE, 4" X20" L, AR4
81401019 **	PACKER, TRIPLE, 4" X20" L, TRANS, AR4
81401020 ***	PACKER, TRIPLE, 4" X20" L, STRADDLE AR4

RF4

81401021	PACKER, DUAL, 4" X20" L, RF3, RF4
81401022	PACKER, DUAL, 4" X20" L, TRANSDUCER
81401023 ***	PACKER, DUAL, 4" X20" L, STRADDLE

81401024*** PACKER,DUAL,4"X20"L,TRANSDUCER

SS4

81401027** PACKER,SINGLE,4"X20"L,TRANS SS4

81401025 PACKER,SINGLE,4"X20"L,SS4

81401026*** PACKER,SINGLE,4"X20"L,SADDLE SS4

Packer Accessories

81400502 KIT,PACKER INFLATION

11400524 TUBING,1/4"NYL

11400522 ASSY,COMPOSITE CABLE,3/16"NYL TUBING W/3/32 STL
CABLE, BONDED

16650300 CABLE,SS,SUSPENSION,3/32"DI

77051004 CABLE,SS-FEP,1/16X3/32" FEP COATED/STAINLESS

77051005 CABLE,SS-FEP,3/32X1/8" FEP COATED/STAINLESS

PPM075001 CABLE,SS,3/16",NYLON JKT

12150810 REGULATOR,600L NITROGEN GAS CYLINDER

* Lower Packer in straddle models have a capped and plugged dual feed thru.

**These models do not have inflation feed thru.

***Lower Packer in straddle models have a capped and plugged single feed thru.

REVISION HISTORY		
PROJECT #	DESCRIPTION	DATE
1439	Release – StellaR	1/17/2020
1690	Removed SS Geosub and replaced with Geosub 2 – StellaR	1/29/2021

The Warranty

For a period of one (1) year from date of first sale, product is warranted to be free from defects in materials and workmanship. Geotech agrees to repair or replace, at Geotech's option, the portion proving defective, or at our option to refund the purchase price thereof. Geotech will have no warranty obligation if the product is subjected to abnormal operating conditions, accident, abuse, misuse, unauthorized modification, alteration, repair, or replacement of wear parts. User assumes all other risk, if any, including the risk of injury, loss, or damage, direct or consequential, arising out of the use, misuse, or inability to use this product. User agrees to use, maintain and install product in accordance with recommendations and instructions. User is responsible for transportation charges connected to the repair or replacement of product under this warranty.

Equipment Return Policy

A Return Material Authorization number (RMA #) is required prior to return of any equipment to our facilities, please call our 800 number for appropriate location. An RMA # will be issued upon receipt of your request to return equipment, which should include reasons for the return. Your return shipment to us must have this RMA # clearly marked on the outside of the package. Proof of date of purchase is required for processing of all warranty requests.

This policy applies to both equipment sales and repair orders.

FOR A RETURN MATERIAL AUTHORIZATION, PLEASE CALL OUR
SERVICE DEPARTMENT AT 1-800-833-7958.

Model Number: _____

Serial Number: _____

Date of Purchase: _____

Equipment Decontamination

Prior to return, all equipment must be thoroughly cleaned and decontaminated. Please make note on RMA form, the use of equipment, contaminants equipment was exposed to, and decontamination solutions/methods used. Geotech reserves the right to refuse any equipment not properly decontaminated. Geotech may also choose to decontaminate the equipment for a fee, which will be applied to the repair order invoice.

Geotech Environmental Equipment, Inc.

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