

# Assembly Instructions for Bondstrand fiberglass flanges

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## Scope

These instructions present Ameron's recommendations for the proper use of Bondstrand fiberglass flanges. The mounting of flanges on the pipe is addressed by the assembly instructions for the particular joint type and adhesive used.

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## Bondstrand Fiberglass Flanges

Bondstrand flanges are Glassfiber Reinforced Epoxy (GRE) filament-wound epoxy pipe flanges in diameters 25 through 1000 mm (1-40 inch) designed to be used in combination with Bondstrand pipes. Flanges are used in Bondstrand pipe systems to connect appendages and equipment, or to make connection with other lines of similar or other material. It also gives the ability to divide a pipeline into several (prefabricated) sections making it easier to install. Three type of flanges are available. Depending on the application and pressure one of the below described flanges can be used.

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## Bondstrand Flange Types

### Hubbed type flange

Applicable for low pressure up to a maximum of 12 bar, and only in combination with flat face counter flanges. Never use this type of flange against raised face flanges or in combination with wafer type valves. Hubbed type flanges are available in sizes 2"-16' with Quick-Lock® adhesive bonded joints.

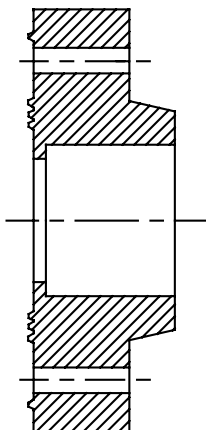
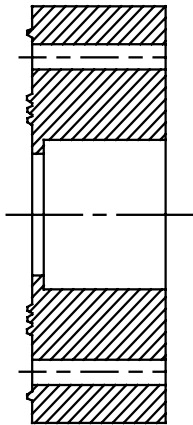


Photo 1 - Hubbed flange

## Bondstrand Flange Types C'nd



### Heavy Duty (HD) type flange

The Heavy Duty type flanges are used for pressures up to 50 bar. HD type flanges are available with a Quick-Lock (sizes 1 - 16 inch) or Taper/Taper (sizes 2 - 40 inch) adhesive bonded joint. Heavy duty type flanges can be used when connecting to raised faced metal flanges and wafer type valves.



Photo 2 - HD flange

### Stub-end (lap joint) type flange

Stub-end type flanges are suitable for high pressures upto 100 bar. Stub end flanges can be supplied with an o-ring groove or a flat face in combination with

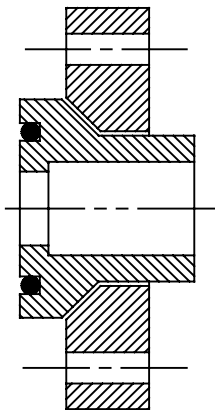


Photo 3 - Stub-end flange

suitable gasket. Stub-end type flanges are available with a Quick-Lock (sizes 1 - 16 inch) or Taper/Taper (sizes 2 - 40 inch) adhesive bonded joint. Stub-end type flanges can be used when connecting to raised faced metal flange and wafer type valves.

Stub-end (lap joint) type flanges consist of 2 parts; A Bondstrand GRE stub with a steel backing ring flange.

Always use a flat faced (stub end) flange against an o-ring sealed stub end flange, when using stub-ends as flange pairs.

## Tooling

Check the presence and quality of joint material (bolt, nut, washer, gasket) and tooling (Photo 1). The tooling and joint material listed below are, as a minimum, required to make a flanged joint. A torque wrench and a ring spanner are required for proper assembly of Bondstrand fiberglass flanges.

1. Level
2. Torque wrench
3. Ring spanner
4. Flange square
5. Winches
6. Band clamp
7. Steel cross



Photo 4 - Required tooling

## Gaskets

- For hubbed flanges use a full-face gasket of a reinforced elastomer;
- For heavy duty flanges use a full-face or raised face gasket of a reinforced elastomer or compressed fiber;
- For o-ring sealed stub end flanges use an o-ring. For flat faced stub end flanges use a raised face gasket of a reinforced elastomer or compressed fiber;
- Gasket material must be suitable for the service pressure, temperature and fluids in the system. Gaskets should be 3 mm thick. The hardness should be 60-75 Shore A;
- When connecting to rubber lined valves, use either flat faced stub end flanges or insert a spacer ring between valve and flange.

See table 1 for pressure rating of the different gasket types.

Table 1: Pressure rating of gaskets

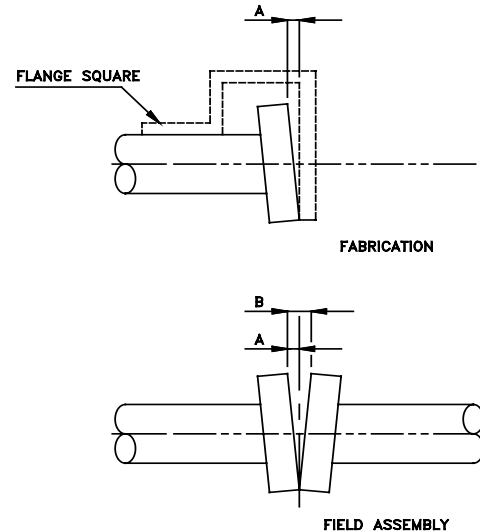
Size Range	Reinforced Elastomer	Compressed Fiber	Steel Reinforced Rubber	O-Ring (stub end)
1 - 12 Inch	16 bar	20 bar	50 bar	100 bar
14 - 24 Inch	16 bar	16 bar	40 bar	75 bar
26 - 40 Inch	16 bar	16 bar	25 bar	50 bar

## Alignment

Flange joints shall be installed aligned and stress free. Never pull flanges together by tightening the bolts. See table below for maximum misalignment allowance.

Table 2: Maximum misalignment allowance

Flange Size Range	A mm	B mm
1 - 16 Inch	1	2
18 - 40 Inch	2	4



Leakage problems due to misalignment could be solved by using o-ring type gaskets e.g. Kroll & Ziller.

## Bolt Length

Note that Bondstrand flanges are thicker than metal flanges and require washers. This should be taken into account when calculating the bolt length. For flange thickness see the appropriate product datasheet, dimension data.

## Connecting to other Pipe Systems

When Bondstrand pipe is connected to metal pipe systems, the interface should be anchored to prevent movement or loads being transmitted to the Bondstrand pipe system.

## Assembly of Quick-Lock Flanges



Prepare the cut pipe end by shaving the appropriate spigot. Apply adhesive to the pipe spigot and flange socket. Refer to the Bondstrand Quick-Lock assembly instructions for detailed instruction on joint preparation and assembly.

Photo 5 - Apply adhesive

## Assembly of Quick-Lock Flanges C'tnd



Photo 6 - Push flange onto spigot

Without delay, slowly push the Quick-Lock flange onto the Quick-Lock spigot in a straight forward motion. Do not rotate or jiggle the flange.



Photo 7 - Check bolt holes alignment

After joint assembly, check the alignment of the bolt holes. Carefully turn the flange to position the bolt holes.



Photo 8 - Final seating

Final seating of the spigot can be accomplished by carefully tapping on a wooden block placed on the flange face. The spigot end should be seated against the bell stop of the socket. For sizes  $\geq 6$  inch a steel cross (see photo 15) can be used to get final seating.



Photo 9 - Check alignment of flange face

Check the alignment of the flange face using a flange square.



Photo 10 - Remove excessive adhesive

Once again check the alignment of the bolt holes. Remove excessive adhesive.



Photo 11 - Cure adhesive joint

Support the flange from underneath while curing to maintain proper alignment. Cure the adhesive joint using an Ameron approved heating blanket. Check the position of the thermostat. It should be facing inwards (6 o'clock position) and must be covered by the blanket. For the smaller sizes (1"-3") special inner blankets are available.

## Assembly of Taper/Taper Flanges



Photo 12 - Apply adhesive

Prepare the cut pipe end by shaving the appropriate spigot. Apply adhesive to the pipe spigot and flange socket. Refer to the Bondstrand Taper/Taper assembly instructions for detailed instruction on joint preparation and assembly.



Photo 13 - Push flange onto spigot

Without delay, slowly push the Taper/Taper flange onto the Taper/Taper spigot in a straight forward motion. Do not rotate or jiggle the flange.



Photo 14 - Check boltholes alignment

After joint assembly, check the alignment of the bolt holes. Carefully turn the flange to position the bolt holes.



Photo 15 - Check insertion depth

Pull the joint together using the winches. Check the insertion depth.

## Assembly of Taper/Taper Flanges C'tnd

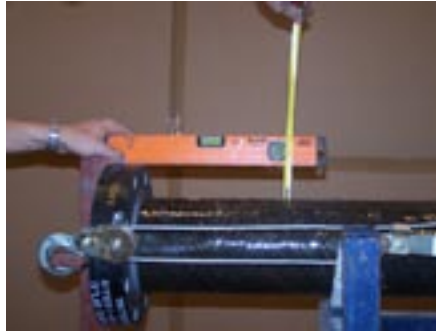


Photo 16 - Check alignment of flange face

Check the alignment of the flange face using a flange square, or by using a level and a measuring tape.



Photo 17 - Check alignment of bolt holes

Once again check the alignment of the bolt holes. Remove excessive adhesive.



Photo 18 - Cure the adhesive joint

Cure the adhesive joint using an Ameron approved heating blanket. Check the position of the thermostat. It should be facing inwards (6 o'clock position) and must be covered by the blanket.

For the smaller sizes (2"-3") special inner blankets are available. Do not remove the winches while curing the joint.

## Flange Jointing



Photo 19 - Place gasket

Place the gasket between the two flange faces.



Photo 20 - Insert bolts

Insert the bolts and finger-tighten all nuts. Bolt threads must be clean and lubricated to attain proper torque. Use lubricated washers under both nuts and bolt heads to protect flange back face.



Photo 21 - Tighten bolts

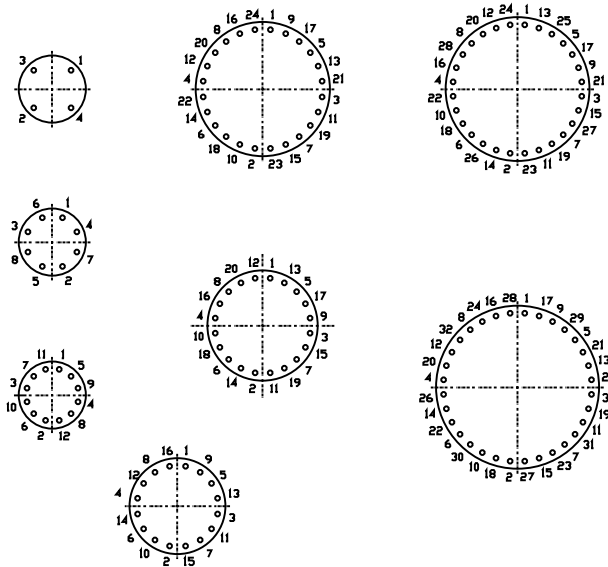
Tighten all nuts following the sequences shown under “tightening sequence”. Do not exceed the torque increments given in “Recommended Bolt Torques.”

After all bolts have been tightened to the recommended torque, re-check the torque on each bolt in the same sequence, since previously tightened bolts may have relaxed.

**Caution: Excess torque can damage the flange and prevent sealing.**

**Note! Always use washers on the back-facing of glassfiber hubbed and heavy duty flanges. For stub end flange assembly with metal flange rings washers are optional.**

## Tightening Sequence



## Recommended Bolt Torques

Table 3: Hubbed Flanges

Flange Size	Initial Torque	Torque Full Pressure Seal
2 - 4 Inch	10 Nm	30 Nm
6 - 12 Inch	20 Nm	40 Nm
14 - 16 Inch	30 Nm	70 Nm

Table 4: Heavy Duty Flanges

Flange Size	Initial Torque	Torque Full Pressure Seal
1 - 1,5 Inch	10 Nm	30 Nm
2 - 4 Inch	20 Nm	60 Nm
6 - 8 Inch	30 Nm	80 Nm
10 - 14 Inch	50 Nm	150 Nm
16 Inch	100 Nm	250 Nm
18 - 20 Inch	200 Nm	400 Nm
22 - 40 Inch	250 Nm	500 Nm

Table 5: Stub end Flanges

Flange Size	Initial Torque	Torque Full Pressure Seal
1 - 4 Inch	20 Nm	60 Nm
6 - 12 Inch	50 Nm	100 Nm
12 - 16 Inch	100 Nm	200 Nm
18 - 24 Inch	200 Nm	400 Nm
26 - 40 Inch	300 Nm	600 Nm

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## Troubleshooting

If the assembled flange joint leaks, loosen and remove all bolts, nuts, washers and gasket. Check for alignment of assembly. Rebuild to correct alignment as required. Check the gasket for damage. If damaged, discard and replace it with a new, undamaged gasket. Check flanges for seal ring damage. In particular, check the condition of the inner seal rings. Flanges with damaged inner seal rings must be removed and new, undamaged flanges installed. If leaks occur as a result of deficiencies in non-fiberglass components of the piping system, consult the manufacturer of the defective components for recommended corrective procedures. Clean and re-lubricate old threads and washers before rejoining. Repeat the joining procedure outlined above. After corrective action has been taken, retest the joint.

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## Safety

Wear suitable protective clothing, gloves and eye protection at all times.



Photo 22 - Safety gear

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## Important Notice

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