

CHECK VALVES FOR CRYOGENIC SERVICE ➔



GOODWIN
INTERNATIONAL LTD

www.checkvalves.co.uk

Goodwin® International is globally approved for its design, manufacture and supply of Dual Plate Check Valves and Non-Slam Axial Check Valves to all aspects of the world's hydrocarbon, energy and process industries – upstream, midstream, downstream. With a track record of supply of over 35 years, Goodwin has an enviable reputation for quality and reliability of product at internationally competitive prices. This high quality product is supported by an organisation that has extensive experience, knowledge and skill sets to meet today's stringent end-user specifications and their quality management systems expectations.

Based in the United Kingdom, Goodwin sells internationally exporting to over 80 countries and providing its customers with outstanding service and support. Listed amongst its customers are the vast majority of the world's end users, both oil majors and national oil companies, and national and international engineering contractors.



A Success Story in LNG

Goodwin has 30 years of supply experience into cryogenic and liquid gas applications and has been a major supplier to the world's new build LNG projects over that time. Both its range of Dual Plate Check Valves and Non-Slam Axial Check Valves are utilized in all facets of the LNG industry – Liquefaction, LNG ships, receiving terminals, LNG tanks, Regasification.

Goodwin has been hugely successful in securing contracts for supply to the world's most prestigious and high value capex LNG export projects as well as many LNG ships and receiving terminal projects. The vast majority of valves are of 316 Stainless Steel constructions for use in Liquefied Natural Gas at a temperature of -161°C . Often these valves are accompanied by a large number of valves of Low Temperature Carbon Steel (LTCS) construction for low temperature service applications and which require low temperature testing.



Check Valve Range for Cryogenic Service

Dual Plate & Non-Slam Axial Check Valves

Size range: 1" to 72"

Pressure Classes: ASME 150 - 2500

Materials: Stainless Steel, Low Temperature Carbon Steel

End Connections: Flanged, Butt Weld End, Hub-end

Further information on these 2 types of valve is available on www.checkvalves.co.uk



Achievable Seat Leakage Rates

A check valve is not a shut-off valve but is the first line of defence it being immediately responsive in the event of an unexpected event producing unwanted reverse flow, e.g. pump failure, pipe rupture. Consequently, in LNG there is invariably a stringency in specification that demands a very high degree of leak tightness across a check valve.

With both its check valve types, Goodwin can meet most customers' stringent tightness requirements. In its Dual Plate Check Valve, Goodwin has a unique (patented) slim plate design that flexes on to the body seat with back pressure enabling a higher degree of shut-off than is readily achievable by its competitors.

Goodwin International is capable of incremental pressure testing at temperatures from room temperature down to -196°C . In its custom built test chamber Goodwin can conduct the safe testing of valves with helium at the full design pressure of the valve (to 20000psig/1380barg) at -196°C .

The test procedure is in accordance with Shell International specification SPE 77/200. Valves to be used in cryogenic or low temperature service are prepared and conditioned.

Seat leakage is measured with calibrated flow meters. Valve Inspection and Test Standard API 598 defines the maximum permissible leakrate with air or inert gas at ambient temperature conditions as 700cc/minute/NPS. However, for cryogenic service Goodwin manufactures, as standard, both its valves with a maximum leakrate of 450cc/minute/NPS (ISO 5208 Rate E) with Helium at -196°C . Goodwin has selected this maximum leakrate in response to the requirements of today's LNG plant designers. Lower leakage rates can be achieved at additional cost.

Acceptance Standards

Seat Leakage: ISO 5208 Rate E - 450 cc/min/NPS
[Note: API 598 - 700 cc/min/NPS]

Outside Leakage (body): Zero

Low Temperature & Cryogenic Testing Procedures

Whether the valve is to be low temperature tested or cryogenic tested, the test method will be in accordance with *SPE 77/200 (latest revision) or similar procedure e.g. BS6364. The sequence of testing per SPE 77/200 is as follows:

- Hydrotest at ambient temperature
Acceptance standard API 598
- Pneumatic test at ambient temperature
Acceptance standard ISO 5208 Rate E
- Cryogenic/Low temperature testing

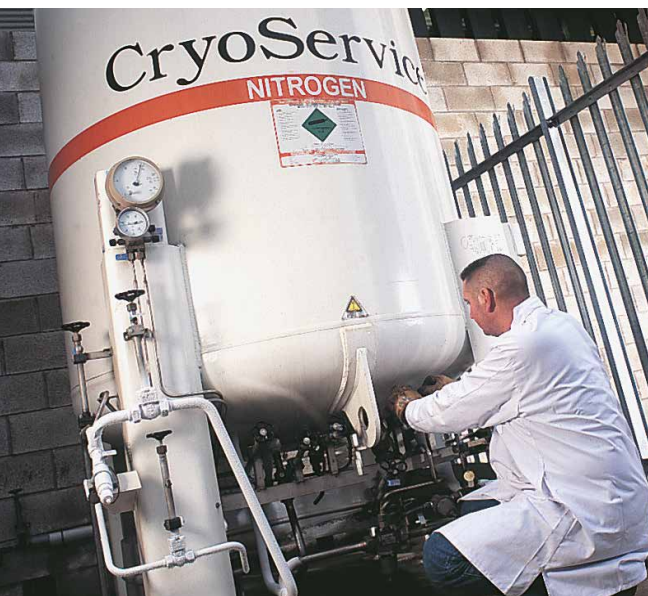
Cryogenic/Low Temperature Testing

Coolant Selection:

Cryogenic testing at -196°C: Immersion of valve in liquid nitrogen.
Low temperature testing -46°C: Immersion in liquid nitrogen vapour.
Intermediate temperature testing: Immersion in liquid nitrogen or liquid nitrogen vapour.

Temperature Control:

Temperature is monitored by the use of thermocouples located both internally and externally of the valve body and internally and externally of the test tank. Once the required valve temperature has been achieved and stabilised the pressure test commences.



*SPE 77/200 is the specification of Shell Global Solutions International B.V. for 'Valves in Low Temperature and Cryogenic Services'

Selection of leak test medium:

Cryogenic i.e. -196°C: pure helium.
Low temperature i.e. -46°C: 99% nitrogen/1% helium mix or pure helium.
Intermediate temperature: pure helium, or 99% nitrogen/1% helium mix dependent on test temperature.

Test Method – SPE 77/200:

Pressure within the test valve is increased in 4 equal increments and seat leakage is measured using a series of calibrated flowmeters. The maximum pressure at which the valve is tested is limited by the Cold Working Pressure (CWP) as designated in ASME B16.34 for the rating of valve under test.

Shell (body) Leakage Test:

Following seat leakage test, the valve is removed from the tank and the valve body integrity is tested whereby the body cavity is pressurised and a shell leak detection test carried out using a Helium Mass Spectrometer. The detection limit for acceptance is 5×10^{-4} mbarl/sec, this being defined as zero leakage.

Test Reports

All observations, data and results shall be recorded in sequence with dates and times into a single Test Report document.

Facilities & Expertise

At Goodwin International's cryogenic test facility, cryogenic and low temperature testing is conducted in accordance with Shell's MESC SPE 77/200 specification or like procedure.

Goodwin can accommodate most clients' testing regimes. With its supply history of some 30 years into LNG and other liquid gas applications, Goodwin has proven experience and expertise in the rigorous testing of cryogenic valves and the meeting of customers' specifications and requirements.

Features

- BS EN ISO 9001 registered facility
- Onsite technical support from qualified engineers
- Onsite skilled fitters
- Provision of Test Report certification



Facilities

- Dedicated cryogenic & high pressure gas test chamber
- On-site bulk liquid nitrogen supply
- On-site portable PMI (Positive Material Identification)
- Thermocouple connections
- State-of-the-art equipment for temperature and time recording and graph plotting
- Calibrated equipment/regular calibration
- Helium Mass Spectrometer
- Drying out/warming furnace

Capabilities

- High pressure gas testing (20000psig/1380barg)
- Testing down to -196°C
- Incremental pressure testing
- Testing to SPE 77/200 (or BS6364 or customer specification)
- Maximum size: to 2m (80") overall dimension
- Maximum weight: 10,000 kg

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FM 00343



EMS 600979



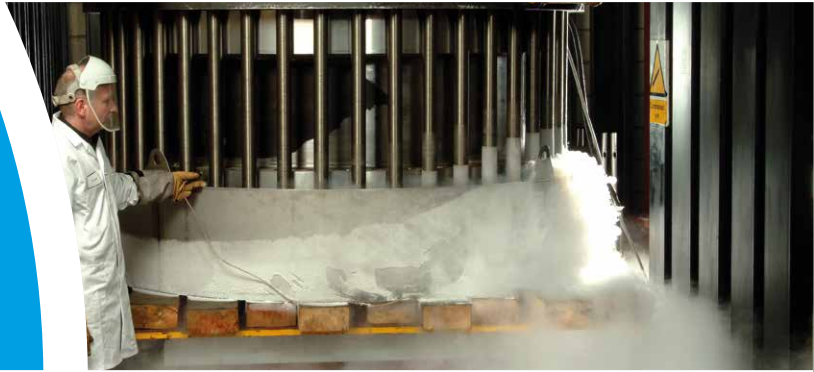
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Certificate No.
CE 55079



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