Dariusz Nowak, Artur Grządziel

Validation and verification procedures for ERRV as an safety aspect of emergency response and rescue in offshore sector

JEL: R41 DOI: 10.24136/atest.2019.263
Data zgłoszenia: 29.01.2020 Data akceptacji: 10.02.2020

The article in a brief form touch the issue of validation and revalidation of the certificate permitting ERRV to carry out rescue tasks and ensure the safety of persons working in the offshore sector, in particular drilling rigs and other installations. Presents the specific tasks and duties of ERRV and the standards that should be met by the crew of these particular vessels. Compliance with certain standards is closely related to the level of crew training and skills of using the equipment on board. It also presents the connections between hydro - meteorological conditions on scene during validation / revalidation exam and results of it.

Key words: obtaining and renewing the certificate and the standards that must be maintained on offshore survival craft.

Wstęp

Over the last several years a large amount of data have been collected during any kind of trials of rescue craft and other survivor recovery equipment.

That kind of information was collected during the validation trials by independent parties, usually on behalf of duty holders, that contract ERRVs to provide offshore oil and gas installation support.

Not so far ago the ERRV have begun collecting by themselves similar information, although not exactly as much detailed due to under an initiative developed by their industry association.

Design and equipment changes of modern ERRV has led to an expansion of their activities to more than providing a rescue/recovery and collision risk warning function as was on the beginning and for many years. Now, many ERRV, whether purpose built or not, undertake in-field transfers of personnel or stores while some “multi-role” vessels have been designed to perform other tasks such as tanker assistance or cargo transfer to/from shore in additional to their traditional emergency response and rescue function.

1.Fundamental duties of an ERRV

The fund0amental requirements for an ERRV vessels are as below:

- rescue from the water or recover persons and provide them with medical aid;
- act as a “Place of safety” following PFEER regulations;
- provide on scene co-ordination, as required, in accordance with relevant Installations’ Emergency Response Plan (ERP);
- fully participate in the execution of the Installation collision avoidance strategy e.g. to monitor the Safety Zone, warn approaching vessels and the Installation of the risk of collision and prevent same where possible;
- act as a reserve radio station.

The Approved Code of Practice (ACoP) accompanying the above regulation states that: "There are many circumstances for which only a suitable vessel standing by will provide effective arrangements and in these circumstances, such a vessel will need to be provided. Such vessels may be shared between Installations provided that this does not compromise the objective of securing a good prospect of recovery and rescue.”

The ACOP also sets out criteria for vessels standing by Installations. The crew of an ERRV should be as shown below. Certification where not noted should be appropriate to Flag State requirements.

Tab. 1 ERRV manning criteria

ERRV group	Total manning	Grade 1 Seaman	Grade 2 Seaman	AMA	FRC crew
A	15	2	3	2	9 /3/ Cox’n
B	12	2	2	1	6 /2/ Cox’n
C	9	2	1	1	4 /2/ Cox’n

In the event that the emergency response and rescue vessel is used and involved in an additional role and duties then an additional risk assessment should be made, in particular for the reason if any of that could impact on its main rescue and recovery role.

The risk assessment should be carried out by knowledgeable, experienced and capable persons closely involved and acquainted with the work.

All risks should be analyzed one by one separately and considered together, and mitigating or remedial measures should be setup and put in place to reduce the total residual risk to an acceptable level. Where the assessment has used the terms low, medium and high the residual risk should not be high. Normal practice analyzing and preparing final risk assessment is to use that grades levels.

A copy of the detailed risk assessment should be kept on board the ship and should be made available to surveyors on request.

2.Legal requirements - PFEER

The Offshore Installations (Prevention of Fire, Explosion, and Emergency Response) Regulations, 1995 (SI 1995 No. 743) (PFEER) is the principal legislation governing offshore emergency response.

Regulation 17 of PFEER states that:

"The duty holder shall ensure that effective arrangements are made, which include such arrangements with suitable persons beyond the Installation, for:

- recovery of persons following their evacuation or escape from the Installation;
- rescue of persons near the Installation;
- taking such persons to a place of safety.
- PFEER Regulations applicable to Recovery and Rescue Arrangements:
- PFEER regulation 5 Assessments;
- PFEER regulation 8 Emergency Response Plan;
- PFEER regulation 11 Communications;
- PFEER regulation 17 Arrangements for Recovery and Rescue.

3.Validation, Revalidation and Verification Trials

Validation, Revalidation and verification is a operation used to affirm or establish the competence of the crew, whilst assessing commitment to reducing errors and adhering to best practice and improving of safe working practice.

The following are differences between validation and verification trials and summarize what was previously arranged and agreed between the Health and Safety Executive and ERRV:

- Validation Trials:
- normally independently witnessed aboard the vessel;
- conducted at least 6 nautical miles offshore;
- extrapolated up to 7m SWH (not 1.5 times);
- conducted at least annually (normally per crew);
- full scenarios simulated with mannequin numbers and spread;
- PLBs not normally used.

Verification Trials:

- conducted off shore on an ongoing basis, often in poorer conditions;
- current reporting regime cannot be extrapolated;
- were not intended to be against the clock to avoid crew taking;
- risks in higher sea states and hours of darkness;
- normally use smaller numbers of mannequins;
- PLBs sometimes used.

There was found to be a little bias towards purpose built ERRV carrying out more trials than their proportion of the whole ERRV fleet would suggest. Furthermore, ERRV fitted with constant tension equipment also tended to carry out more trials than those not fitted.

That was highlighted the difficulty of providing anything other than indicative average times for survivor recovery in known weather conditions it was found to be impossible to make predictions on how long recovery may take in more adverse weather beyond the scope of the trials.

Simple extrapolation of the results to higher sea states was found to be invalid, even if the results of this looks satisfactory, they would fail to take into account many other factors that could influence performance such as wave steepness, modernity and fitness for purpose of equipment, and crew training and competence.

Overall the trials dataset is a useful source of information and could become more valuable if data will be added continuously. Further value could be added to the data to make it more confident for example by indicating the time of day that the trial was carried out.

A great step in extending the operational abilities of rescue craft was the introduction of constant self-tension equipment on davits. The use of this equipment reduces the possibility of injury to rescue craft crews and damage to boats through removing the susceptibility of 'snatch' when a fall becomes slack and then bears the full weight as a craft is first lifted on a wave or swell peak and then falls into a trough. With constant tension engaged a fall winch pays out or heaves to keep a limited tension on the fall until ready for hoisting which can then be done quickly and seamlessly.

During the launch/recovery operations of both FRC and DC are the limiting factors to their use especially the recovery operation when the craft may be heavier with survivors on board or having shipped water. Particularly is the difficulty that crew may experience when attempting to reattach the rescue craft's fall(s) in a seaway. The adoption of single point lifting device made connection much quicker and less fraught than with double falls but even so the recovery still required a high degree of professionalism and teamwork between the craft's crew and those operating the davit on board the ERRV.

However, in some cases the weather conditions are too severe to launch/recover rescue craft and in these circumstances ERRV are provided with a mechanical recovery device to recover survivors directly from the sea - Dacon Scoop. The equipment is a crane operated rescue net for recovery of casualties from the water directly on board rescue vessels.

4.Performance Standards

Providing an effective rescue and recovery equipment is only part of the overall policy and goes hand in hand with proper and on-going training for ERRV crews. To satisfy the main aim that a 'good prospect of rescue and recovery' can be achieved there is a requirement of frequent drills to be carried out onboard ERRV.

Regardless of the severity of the weather conditions in which trials are carried out, even if they are consistently up to 100% of the worst expected, there is always the possibility that a rescue craft may be called upon in even worse weather. In these circumstances the theoretical maximum launch conditions have to be relied upon which, may be subjective at best and suspected at worst. When operating in conditions beyond which regular trials and drills have been carried out those involved begin to have to rely on good luck to achieve a successful result.

Tab. 2. Recovery and rescue standards criteria

Emergency incident	EERV / rescue craft response time	Person in the water	Time to place of safety	Operational guidelines
Installation escape to sea	2 mins	21	120 mins	Last survivor recovered to the place of safety within 120 mins up to sea water high circa 7 m. Often 5.5 m.
Helicopter incident	2 mins	21	120 mins	Last survivor recovered to the place of safety within 120 mins up to sea water high circa 6 m.
MOB – overside work	2 mins	1 - 4	20 mins	Overside work operations generally restricted to a sea water high of 3.5 m.

Note: rescue craft should be in position to rescue the first casualty from the sea within 4 mins.

5.Validation Environmental Coefficients

Weather conditions experienced on the UKCS can be some the most hostile in the world. In this article we strictly relate to above mentioned area because as mentioned in the preface, author has an opportunity to serve onboard ERRV vessel in that area for several years.

Generally the predominant wind direction is from the south-westerly quadrant with the winter season we can expect more severe weather conditions than the summer, although it is possible for adverse weather to be experienced at any time of year and from any direction.

Significant wave height

Significant wave height (Hs) (SWH) is widely used parameter to determine the minimum operational limits for rescue craft activities. It is defined as the mean height of the highest one third of waves and is a measure of the total energy in the wave spectrum.

The total wave come from two sources; wind waves and the swell.

Wind waves are locally generated waves that can have a wide range of directions and can cause a highly irregular sea surface. Swell is formed as a result of wind elsewhere and can have originated a great distance away. The swell wavelength is much longer than that of wind waves and the period is also greater. In general, swell wavelength and period increase with time and with the distance from their source.

Wave steepness (S)

Although (Hs) is the commonly use measure when considering whether it ought to be possible to carry out rescue craft operations, another indication may be the wave steepness (S).

Generally this is the ratio between the wave height and the wavelength. it can also be determined from the wave period (TP), such that:

$$S = 2\pi Hs/gTP^2$$

where:

$$g = 9.81\ ms^{-2}$$

Wind speed

Wind, local or at some distance away, is responsible for the generation of surface wind waves and swell. Factors that affect wave development are the wind speed, the distance over which the wind has blown, the time that the wind has been blowing, the water depth and the relative direction of tidal stream and current to the wind.

Effect of wind and waves

Above a typical weather conditions are presented:

In practical terms the result of these can be described by following effects:

– operation of rescue craft is likely to be affected more by wind waves than by swell;
– wind speed although easy to determine is not a reliable indicator of likely conditions to be experienced. Further, wind speed has less of an effect on the operation of rescue craft, especially FRC, than the effects of waves and swell;
– wave steepness is more location specific than considering wave height.

Further, wind speed has less of an effect on the operation of rescue craft, especially FRC, than the effects of waves and swell; wave steepness is more location specific than considering wave height.

Differences in wave steepness could enable a successful launch/recovery in one area whereas it could be prevented in another even though both have the same wave height, conflicting current and wind directions will cause a steepening of the seas.

Author have several times been audited by Seacroft's auditors during his service onboard the offshore vessels, so below, some of examples of graphical reports prepared by this Company are presented.

Seacroft Marine is a leading experts in offshore recovery and rescue service across the UK. Pioneering ERRV sharing arrangements to ensure an effective yet efficient level of support without compromising safety

Seacroft's Extrapolation Model, developed by Shell, was acquired, reviewed and accepted by Industry bodies as a best industry practice. They have conducted thousands of trials on location and offshore locally(> 6 nautical miles). All trials simulated reasonable and realistic scenarios but never conducted in conditions that risk crew safety. The risks are always effectively managed.

Bibliography:

1. Oil & Gas UK. (2018). "Emergency Response and Rescue Vessel Management Guidelines". Issue 6;
2. Oil and Gas UK. (2008). "Emergency Response & Rescue Vessel - Survey Guidelines". Issue 5;
3. Health and Safety Executive Research Report (2007). "Analysis of ERRV trials data from ERRV and Seacroft";
4. Nowak D. Wąż M. (2019) "ERRV as an emergency protection components in the offshore sector activities." Scientific Journal of Polish Naval Academy (LX) Vol.216 no.1. pp.59 – 67.DOI: 10.2478/sjpna-2019-0005

Procedury walidacji i weryfikacji ERRV jako aspekt bezpieczeństwa reagowania w sytuacjach awaryjnych i ratownictwa w sektorze morskim

Artykuł w skrótowej formie porusza zagadnienie dopuszczenia i kolejnych odnowień certyfikatu dopuszczającego jednostki ERRV do wykonywania zadań ratowania i zapewnienia bezpieczeństwa osobom pracującym w sektorze offshore, w szczególności na instalacjach wydobywczo eksploatacyjnych. Przybliża konkretne zadania i obowiązki jakie stoją przed jednostkami ERRV oraz standardy jakie powinny być spełnione przez załogę jednostek. Spełnienie określonych standardów powiązane jest ściśle z poziomem wyszkolenia załogi i umiejętności wykorzystania sprzętu i wyposażenia znajdującego się na burcie. Przedstawia również zależności pomiędzy warunkami hydro – meteorologicznymi a wynikami egzaminów odnawiającymi certyfikat.

Słowa kluczowe: uzyskanie certyfikatu i jego odnowienie oraz standardy które muszą być zachowane na jednostkach ratowniczych w sektorze offshore.

Autorzy:

Dariusz Nowak - Polish Naval Academy, Faculty of Navigation and Naval Weapons; Śmidowicza 69; 81-127 Gdynia; Poland
d.nowak@amw.gdynia.pl

Artur Grządziel - Polish Naval Academy, Faculty of Navigation and Naval Weapons; Śmidowicza 69; 81-127 Gdynia; Poland
a.grzadziel@amw.gdynia.pl